

# Metallica.



OR

## The Treatise of Metallica.

*Briefly comprehending the Doctrine of  
diuerse new Metallicall Inuentions, but especially,  
how to neale, melt, and worke all kinde of mettles,  
Irons and Steeles with Sea-coale,  
Pit-coale, Earth-coale and  
Brush-fewell.*

Also a Transcript of his Maiesties Letters  
*Patents of Priuiledge, granted vnto Simon  
Sturteuant for the said Metallicall busineses,  
for one and thirty yeares.*

*Published in Print before the last day of this pre-  
sent Easter Terme, as the said Simon Sturteuant  
was by his Highnesse inioyned.*

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Imprinted at London by *George Eld.*

*Cum priuilegio.*

Anno. 1612. May. 22.

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## The Preface to the Reader.



Entle Reader, I am not ignorant, how they that are willing to apprehend and assist new businesles, are desirous to be satisfied in these points. First concerning the perfect and exact knowledge of that Inuention wherein they are to deale and negotiate, for as the common Prouerbe saith; *Ignoti nulla cupido*. The second is, touching the worth and goodnesse of the businesse, and how the benefit thereof may bee raised. The third is the habillity of the Inuentioner, to effect and performe his proiect propounded. The fourth is concerning the manner of contracting or bargaining; In all which, I will endeauour to giue the best satisfaction that I may, out of the precepts and grounds of this present Treatise of *Metallica*. And therefore concerning the first point. The Transcript of his Maiesties most gracious grant and priuiledge doth euidently shew and informe the Reader, that amongst many other inuentions

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granted for one and thirty yeares, my Selfe, my Executors, Deputies and Assignes, may *only* make, practise, and put in vse, within any of his Maiesties Realmes and Dominions, the working, melting, and effecting of Iron, Steele, and other Mettles with Sea-coale, or Pit-coale. The principall end of which inuention is, that the Woods and Timber of our country might be saued, maintained and preserved from the great consumption and waste of our common Furnaces and Iron-Milnes, which as they are now ordinarily built and framed, can burne, spend, and consume no other fewell but Char coale. The which deuise if it may bee effected accordingly (as I make no doubt but by Gods blessing I shall) will prooue to bee the best and most profitable businesse and Inuention that euer was knowne or inuented in England these many yeares.

For (to speake nothing of the great benefit, and profit which may bee raised and made by twenty other Inuentions comprised and  
com.

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comprehended vnder the Pattennt) the yearly  
vallew of this mettle-businesse alone, will  
amount vnto 330. thousand pounds, *per annis*,  
after the second or third yeare, as appeareth  
by this calculation.

*A Calculation shewing how the Mettle  
Inuention or Art, which maketh all kinde of  
Mettles or Metalique substance, with Pit-coale  
or Sea-coale, will bee worth per annum. 330.  
thousand pounds, immediately after the two  
first yeares, which are the allotted times for  
Tryalls and Conformities, without any charges,  
(except the charges of Tryalls) to the Pat-  
tentees, Partners, Assistants, and Dealers.*



Here are planted already in Eng-  
land and Wales, eight hundred  
Milnes for the making of Iron,  
for there are foure hundred  
Milnes in Surry, Kent, & Suffex,

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as the townesmen of Haslemore haue testified and numbred vnto mee, there are also 200. Milnes in Wales, and 20. in Nottinghamshire, as the Author hath beene credibly informed.

Now wee may well suppose, that all England, Scotland and Ireland (besides the fore-named shires) will make vp the number of 180. Milnes more, being in all 800. Milnes.

Moreouer one Milne alone spendeth yearly in Charcoale 500. pound and more, as diuerse Clarkes and workmen in Iron busineste, haue credibly testified, which in pit-coale will be done with the charges of 30. or 40. pounds, after the Inuentioners manner and inuention, or at the most with 50. pound, where carriage is farre and chargeable.

So that this new Inuention in the 800. Iron milnes, will saue and gaine *de claro* the owners of those milnes 320. thousand pounds yearly, ouer and aboue their ordinary and annuall gaines, as it appeareth by this proportion.

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One Milne alone saue yearely	} 400.li.	{ Ergo, 800. Milnes saue yearly 320. thousand pounds.
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Againe the said *Metalique* inuention, beeing put and conuerted to Lead, Tinne; Copper, Braſſe, and Glaſſe-mettle, in all the ſeuerall Mineralls of England, Scotland, Ireland and Wales, will queſtionleſſe cleare yearely, by meanes of Fewell, about ten thousand pounds more; ouer and beſides the ordinary gaines in the ſaid buſineſſe. So that the yearely Iron reuenues, added vnto theſe other *Metalique* reuenues, doe amount vnto 330. thousand pounds, as was ſaid before.

Now out of theſe *Metalique* gaines of 330. thousand pounds yearely, the owners of the Milnes, Hearths, and Furnaces, may haue and receiue liberall rates and proportions allowed and allotted vnto them, ouer and beſides their ordinary gaines, onely in lieu of conforming their Furnaces, Fineries and Chafferries to this Inuention of Pitt-coale  
and

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and Earth-coale. And also the Kings most excellent Maiestie, the Prince his Highnesse, the Duke of Yorke, the Lord Vicount Rochester, and other parties interessed in the Pattent, may by their Composition and agreement with the said Owners and Iron-Maisters, yearely receiue, by way of rents and licences, the residew of that gaines which remaineth ouer and aboue that which was allotted and allowed to the Iron-Maisters, for applying of this Inuention to their ordinary way of making of Iron, as more fully shall bee specified, shewed, and prooued in the Appendix of this Treatise, which I am now preparing for the Printer and the Presse with all conuenient speed.

This may suffice therefore, to giue the Reader satisfaction, concerning the two first points, for the knowledge and the worth of the busineses, and concerning the manner how certaine yearly annuities may bee raised to the dealers and assistants.

Now

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Now to perswade the third point, that the Authour is able to effect the worke vnder-taken, in as ample manner as hee propoundeth; wee plead and alledge as followeth.

First the Inuentioner by his study, industrie, and practise, hath already brought to passe and published diuerse proiects and new deuises, as well Litterall as Mechannicall, very beneficiall to the common-wealth. His Litterare Inuentions doe appeare and are knowne partly by his Printed Treatise of *Dibere Adam*, which is a Scholasticall engin *Aucomaton*, and partly in diuerse other Manuscripts which he hath to shew. His new Mechanicks already performed, are to bee seene in the Inuentions which hee calleth by the names of *Press-wares*, *Wood-pleits*, *Ballance*, *Engin*, *Baramyha*, and *Hubla*, of all which in priuate speech hee is ready more largely to conferre, and to manifest their truth and goodnesse at his Worke-houses at Islington and Highbury. To con-  
1 Sam. 17:34: Thus Dauid reasoneth from

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the Beare  
and Lyon  
to Golyah  
the Gyant.

to effect his Inuention of Iron-works, as also  
all his other *Metallique* deuises and Inuentions,  
heere contained in the Patent, or Priuiledge of  
*Metallica.*

Secondly the consideration of things in  
the like nature with it, are good inducements  
to perswade vs well of this proiect, for Brick-  
making, Brewing, Dying, Casting of Brasse-  
workes, &c. were (not many yeares since) done  
altogether with the fuell of wood and Char-  
coale; in stead whereof Sea-coale is now vsed  
as effectually and to as good vse and purpose.  
Againe (that which is somewhat neerer the  
marke) the Blacksmith long agoe forged all  
his Iron with Char-coale (as in some places  
where they are cheape they continue this  
course still) but these many yeares small Sea-  
coale hath, and doth serue the turne, as well  
and sufficiently. Adde heerevnto, that very  
lately by a wind-Furnace, greene glasse, for  
windowes, is made as well with Pit-coale at  
Winchester house in Southwarke as it is done  
in other places with much wast & consuming  
of



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of infinite store of Billets and other Wood-fuell.

Thirdly the Inuention hath already experimented and made tryall of the cheite particular meanes and Instruments of diuers cheape waies of making of Irons in reall and substantiall moddles to him-selſe (though in small things, according as his meanes would giue him leaue.) And this of his credit and honesty he auoucheth and protesteth : wherefore hee more confidently presumeth to worke the ſame effects in grander Instruments and meanes of triall, after that hee hath receiued allowance of the dealers and assistants for it.

Fourthly there can bee no doubt of performing the matter propounded, if the Inuentioner can but make, or cause Sea-coale to become as seruiceable for *Metallique* purposes as wood & Char-coale is: The art and skill whereof consisteth cheifly in three points: The first is to bring Earth-coale to that equallity of heat that Wood or Char-coale hath; That is to say, that it make neither hotter nor colder

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fier then the Wood or Char-coale doth : The second meanes , is so to order and prepare Pit-coale , that all malignant proprieties , which are averſe from the nature of Merallique ſubſtances , may bee extracted from it , or at leaſt deſtroyed in it : The third meanes is , the addition and infuſion of thoſe deficient proprieties , which as they are in Char-coale , ſo ought they to be found in Pit-coale.

Now this three-fold miſtery and ſecret , the Author can certainly performe and atchieue , by the powerfull efficacie and meanes of his dexterous prerogative instruments , deviſed for this purpoſe ; as more at large is ſhewed , both in this Treatiſe , and in the Apendix , which very ſhortly ſhall come forth , and alſo ſhall be further confirmed and juſtified by his dayly experiments and tryals , which hee will bee ready to ſhew to them whom they ſhall any wayes touch or concerne , or to them who are otherwiſe deſirous to aſſiſt and deale for the experimenting and accompliſhing of theſe ſo worthy good buſineſſes . And then  
alſo

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also they shall know my purpose for *Contracting* and *bargaining* by word of mouth, as it is best fitting for priuate dealings and negotiations.

And thus ( hauing briefly touched these foure premised points ) I conclude and shut vp this Preface of *Metallica*. Humbly and vnfeignedly beseeching the Lord, who by his holy spirit inspired \* *Bezaleel*, *Aholiab* and *Hiram*, with the light of Mechanicall Inventions, *and in all manner of workmanship*, for his effectuall blessings in these our enterprises, that that which was begun in his feare, may be prosecuted & fully accomplished and built by his heavenly & helpful hands, to the glory of his name, and for the good well-fare and emolument of the Kings most excellent Maiestie, the Church and the Politicall estate wherein wee liue. *Amen.*

*Exod. 31. 1. 2.*

*2. Cro. 2. 7. 14.*

*Nisi dom: adi-*

*ficerat.*

*Psal. 127*

*Simon Sturteuant.*

To the Reader, concerning  
the *Errata*.

**T**O pretermitt the correction of the lesser literare faults,  
read and place, I pray you, the foure first lines. pag. 73.  
immediately before the 61. question, for they are misplaced.

*Errata.*

Pag. 17. l. 12. 31. parts, *for* 33. parts. pag. 45. l. 11. Ignimetallica, *for* In-ignimetallica. pa. 56. l. 17. Instruments *for* Emporeuticks. *ibid.* l. 21. Instrument, *for* Emporeutick. pa. 73. l. 13 consisteth, *for* consisting. pa. 76. l. 7. diuers meanes, *for* diuers things. pag. 77. l. 11. bee incroached, *for* bee not incroached. pa. 93. l. 26. edge, *for* edge-toole. pa. 94. l. 3. fier, colouring, *for* fier-colouring. pa. 108. l. 10. alter-flagge, *for* after-flagge.

In the Epistle to the Reader, in some copies, pag. 1. of A. l. 11. *Dibere* *for* *Dibre*. l. 12. *Ancomaton*, *for* *Antiquation*. l. 18. *Hubla*, *for* *Lubla*.







# Metallica.

## CAPVT. I.

*The Transcript of his Maiesties Indenture.*

*Reader.*



*S I vnderstand, you haue promised and conenanted in your Pattent more fully and enidently to expresse and enlarge in a Printed treatise, to be called Metallica, every point and part of your priuiledged businesse, to the intent that the Reader might the better conceine and iudge of the Inuentions propounded, and might the sooner also bee induced to asist, and set forward, so good and worthy workes: First therefore I demand of you by what name and appellation you entitle that generall head, vnder the which you reduce and comprehend all the seuerall Arts and Inuentions of your Pattent.*

*Author.* The generall, that comprehendeth all the other perticular Inuentions, is called *Metallica*, which is a word deriued and deduced from the Greeke and

B

Latin

Latin words *Metallon*, and *Metallum*, which signifie, in English, Mettles, which properly are Minerall substances, digged and taken out of the earth, of which sort, are Iron, Lead, Tin, Copper, Brasse, Gold, and Silver, &c.

R. 2. *Doth your Pattent of Metallica, onely containe the making of mettles by the meanes of Sea-coale and Pit-coale, and with your other Metallicall instruments which you haue deuised for that purpose.*

A. His Maiesties gracious grant is very large and ample, for it doth not onely comprehend and priuiledge the making of all kinde of mettles, after the manner prescribed, but also equally authorizeth and licenseth any other Mechanick inuentions comprehended vnder the generall definition of *Metallica* which is mentioned in the Schedules or Manuscript treatise annexed to the Pattent, which Schedules haue the same force and validitie as his Maiesties Indenture it selfe.

R. 3. *Then that I may certainly know and vnderstand the extent of your priuiledge, repeate, I pray you, word by word, the definition of Metallica, as it is written in the said Schedules, annexed to your Pattent.*

A. *Metallica* mentioned in the petition, is thus defined. *Metallica* is an Art or Inuention, shewing how diuerse things and Materia's, now made and attained vnto, in a very chargeable sort, after the ordinary way, may be made and attained to after a more cheaper manner, and as with the helpe of common instruments: so more especially by diuerse new deuised

*Metallica*



*Metallicall instruments and meanes.*

From these *Metallicall* instruments, the Art is generally called *Metallica*.

R. 4. *This summary definition giueth mee some general light and vnderstanding into your businesses, but that I may bee the more fully satisfied, I pray you rehearse also the tenour of his Maiesties grant, as it is vnder the broad scale of England.*



James R.

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**HIS** Indenture made;  
the xxix. day of February, in  
the yeares of the Reigne of our  
Soueraigne Lord *James*, by the  
grace of God, King of Eng-  
land, Scotland, France and Ireland, defender  
of the faith, &c. of England, France and Ire-  
land the ninth, & of Scotland the xlv. Betwene  
our said Soueraigne Lord, of the one party,  
and *Simon Sturteuant* Gentleman of the other  
party. WHEREAS the said *Simon Stur-*  
*teuant*, by long his study & great charge, hath  
attained vnto diuerse new exact Mechanick  
Arts, Mysteries, Waies and Secrets of his own  
Inuention, whereby all kind of mettles, works,  
and other things and materialls, as namely  
Irons, Steeles, Leads, Tins, Coppers, Brasles,  
and such like. Secondly all kind of Metalique  
concoctions, as Sand-mettles, Ash-mettles,  
Ammels, and such like. Thirdly, all kinde of  
Burnt-earths, as Tiles, Paving-stones, Bricks,  
and such like. Fourthly all kind of Prest-wares,  
as Prest-tiles, Prest-bricks, Prest-monions,

Prest-stones and such like, with diuerse other things and materials now made after the ordinarie course, with Wood-fewell and Char-coale, may be aswell made, wrought, and effected, as the said *Simon Sturteuant* affirmeth, with Sea-coale, Pit-coale, Earth-coale, and Brush-fewell, whereby the Woods now generally wasted, in all the chiefe wood-land countries of this realme of England by Iron milnes, and such other Metalllicall Furnaces and hearths, may be preserued from the great consumption thereof, and saued from like inconuenience in other his Maiesties dominions, all which premisses, so by this new Inuention to be made, the said *Simon Sturteuant* hath vnder-taken, shall be in substance and for vse as sufficient and as good as the other like Materialls now made and wrought with the chargeable and excessiue waste of Wood and Char-cole. AND whereas also the said *Simon Sturteuant*, for the better making, working, effecting, beating, burning, melting and effecting, the said mettals, workes, things, and Materialls, by and with Sea-coale, Pit-coale, Earth-coale, and  
Brush-

Brush-fewell, hath by his said Inuention and skill, inuented diuers Furnaces, hearths, tests, tooles, engins, milnes, and other instruments and meanes, new, and of his owne Inuention, neuer heretofore vsed or put in practise by any other. And hath also by his said Inuentions and skill, attained to the knowledge how to vse and imploy diuerse other common instruments, to the making, working, and effecting the said mettles, workes, materials, and things, which other common instruments haue bin heretofore, and are vsed in other arts, sciences, and manuell occupations, but were not, nor haue bin as yet conuerted, vsed, or imployed, to, for, or about the making, working, effecting, & producing the said mettels, works, materials and things: which said skil & Inuention of the said *S. Sturteuant*, & the said mettles, workes, things, and other Materials, and the meanes and instruments whereby to worke and effect the same, are in some measure mentioned and expressed in the Schedule or Schedules, to these presents annexed, and shall bee more fully, amply, and perticularly demonstrated

strated, specified, described, and conteined in a large treatise, which the said *Simon Sturteuant* hath already conceiued, and shall bee put in Print, and so published before the last day of Easter terme next ensuing the date hereof, which Treatise so to bee Printed, shall be intituled, *A Treatise of Metallica*: which said Inuentions of the said *Simon*, may and will prooue beneficiall to the common-wealth, both in regard of the abundant plenty of the said things and materials which it daily will bring forth, as also because it saueth and preserueth abundance of Timber, Char-coale, Wood-fewell, and other things and commodities wastefully consumed and spent, the generall want whereof already is felt. AND, for asmuch as our said Soueraigne Lord is giuen to vnderstand, that this art, skill, industrie and inuentions of the said *Simon Sturteuant*, of making, casting, founding, working, and acquiring of the aforesaid mettles, workes of Iron, materials, & things by Sea-coale, Pit-coale, Earth-coale and Brush-fewell, and all and euery, or any of them,

them, and also the making of the said new deuised engins, hearths, furnaces, and other meanes and instruments, and the imploying of the said instruments, vsed in other sciences and Arts, to the making, working, effecting, and producing the said Mettales and other workes, materials and things, is a thing not yet practised nor brought into any trade, occupation or mysterie, within any of his kingdomes, but is an Inuention in substance new, and which shall not preiudice or crosse any from priuiledge or grant by his Maiestie heretofore made or granted vnder the great seale of England, for the vsing and making of any former Inuention, and therefore fit to bee priuiledged for a certain time, the rather for that his Highnesse conceiueth, that the said inuentions and skils, may and will become profitable and good for the common-wealth of these realms, and also augment his customes and impost, in regard it bringeth forth great and abundant store of the aforesaid Materials and things, not onely for the vse of his Highnesse realmes

and dominions heere at home, but also for trafficke and Marchandize into forraine Countries abroad, which are customeable. In regard whereof and also for, and in consideration of the good, faithfull and acceptable seruices heeretofore done and performed vnto his said Maiesty, by the said *Simon Sturteuant*, As also to the end that the said *Simon Sturteuant* may receiue some conuenient recompence, benefit and profit for his said seruices, as also for his studies, laboures and charges in perfecting these Inuentions, to the Common good, which may ensue heereby to his Highnes Realmes and Dominions. THIS INDENTVRE WITNESSETH that our said soueraigne Lord the King, of his especiall grace, certaine knowledge and meere motion, and of his prerogatiue royal, hath giuen and granted, and by these presents for him, his heires and successors doth giue and grant, vnto the said *Simon Sturteuant*, his executors, administrators and assignes, and his, and their Deputy and Deputies the sole, full, absolute and free power, liberty  
and



and authority, to make, worke, produce, acquire and bring forth, all kinde of the aforesaid mettles, and other the materials, and things, by, and with Sea-coale, Pitt-coale, Earth-coale, Brush-fewell, and all, euery, or any of them, in all parts and places of his Maiesties realmes of England, Scotland, Ireland, and Wales, and also within all the same places and dominions, to make, frame, erect, acquire, and prouide, or cause to bee made, framed, erected, acquired, and prouided, all necessary Instruments and meanes. As namely, all Worke-houses, Furnaces, Hearths, Milnes, Structures, Engins, Vessels, Tests, Tooles, Instruments, Deuises, or things of Iron, or other stuffe or substance whatsoeuer, which are already in vse, in any other trade, mysterie, arte, or occupation, and as yet not exercised or vsed, in, or about the making, working, casting, founding, acquiring, and producing of the sayd mettles and other materialls and things, for, and to the end and purpose aforesaid, *viz.*

to make, worke and effect the said mettles, and other materials, and things, by, and with Sea-coale, Pit-coale, Earth-coale and Brush-fewel, and all, euery, or any of them. And also in all the said places and dominions, to make, frame and erect, vse, and imploy, or cause to be framed and erected all the said new Furnaces, hearths, deuises, instruments and meanes, which are meerely of the new Inuention of the said *Simon Sturteuant*, to, for, in, or about the making, working, casting, founding, acquiring, and producing of the said mettles, and other the said Materials and things, and to all or any other purpose or purposes vse or vses, whatsoeuer, in as ample sort and manner as they or any of them are described, expressed, or mentioned in the Schedule to these presents annexed, or shall be more fully demonstrated, specified, or mentioned in the Treatise of *Metallica*, which shall bee as aforesaid Printed, before the last day of Easter Terme next ensuing. AND our said Soueraigne Lord doth further by these presents, for him, his heires, & successors, assigne, appoint, ordaine, constitute, licence

licence and authorise the said *Simon Sturteuant*, his executors, administrators, and assignes, to haue the sole power, liberty, and authority, by and with Sea-coale, Pit-coale, Earth-coale, and Brulh-fewell, and all, euery, or any of them, and by his said Inuentions, arts, and skills inuented and deuised for the making of all kinds of the said mettles, and other the Materials and things, and also for the making, framing, and erecting of 'all such Instruments and meanes, as Worke-houses, Furnaces, Milnes, Quernes, Structures, Engins, Vessels, Toolles, Instruments, Deuises, and things heretofore vsed in any other Arts or Sciences, to bee employed or vsed in or about the making, working or producing the said mettals, things, and materials, or any of them, as a foresaid, and also to haue the sole power, liberty, and authority, for the making, framing, erecting, or producing of all the said new deuises, instruments, and meanes *Metallicall*, as aforesaid, in what sort, or about what thing soeuer the same or any of them shall bee vsed or employed: and that the said *Simon Sturteuant*, his

executors, administrators, assignes, and his & their deputy & deputies, & none other, without his, or their speciall licence or tolleration, shal or may make any kind, or kinds of the said metles, & other the materials & things, by, or with sea-coale, pit-coale, earth-coale, & brushfewel, or al, some, or any of them, by means of, or by vsing & imploying the said Inuentions of the said *Simō*, or any part or parcel of the, or any of the, or make, frame & erect, any the said work-houses, furnaces, hearths, milnes, structures, engines, tests, vessels, tooles, instruments, deuises & things heretofore vsed, in any other arts, or sciences, which by the said inuentions of the said *Simon*, shalbe transferred or conuerted, or turned to be vsed, exercised & imployed, in, or about the making, casting, founding, working, acquiring and producing of the said metles or materials, things and deuises, by, or with Sea-coale, earth-coale, pit-coale, and brush-fewell, or all, some, or any of them, or to make, frame, or erect, any of the said new deuised instrumētts and means of the said *Simon*, either to the making, casting, working, or effecting, all or any the said works, metles, or materials, by or with  
 sea-

sea-coale, earth-coale, and brush-fewell, or all, some, or any of them, or to any other end or purpose whatsoeuer. TO haue and to hold, vse, exercise and enioy, the sole making, casting, founding, working, tempering, acquiring, and producing of all and euery the said metles, and other the said premises, in maner & forme aforesaid, and to the end & purposes aforesaid, vnto the said *S. Sturtenant*, his executors, administrators and assignes, and by his and their deputy & deputies, for & during the time and terme of 31. yeares, now next coming, immediarly from & after the date of these presents. Yeelding, rendering & paying therefore, yearly & euery yeare immediarly, from, and after the date hercof, for, and during the said terme of 31. yeares, to our said Soueraigne Lord, his heires and successors, at the receipt of his Highnesse Exchequer at Westmin. alwaies in the terme of *S. Michael*, ten parts of such sum or sums of money, and other cleare yeerely profits, in 33. parts to be deuided, as he the said *Simon Sturtenant*, his executors, administrators, or assignes, shall yearely haue or receiue, during the said terme of one and thirty years, by way of composition or otherwise, for,

or

or by making, framing, or erecting, casting, founding, and acquiring, or otherwise, for licensing or authorising any person or persons whatsoeuer, to make, frame, cast, erect, found, or acquire, any of the said Materialls, Workehouses, Furnaces, Hearths, Milnes, Structures, Engines, Vessels, Tests, Tooles, Instruments, deuises, and things aforesaid, The charges and expences in and about the same, and euery of them, expended out of the said thirty three parts, alwaies deducted and allowed to the said *Simon Sturteuant*, his executors, administrators and assignes, And likewise yeelding, rendring, and paying, vnto the most excellent Prince *Henry*, eldest sonne of our said Soueraigne Lord, Prince of Wales, Duke of Cornewall, and Earle of Chester, & his executors or administrators, yearly and euery yeare, during the said terme of one and thirty yeares, in the same termes of Saint *Michael* fīue parts of the said summe and summes of money, and other cleere profits in thirty three parts to bee deuided, to bee alwayes paid and deliuered to such person

person or persons as the said most excellent Prince shall appoint to receiue the same, at his highnesse Pallace of Saint *Iames* in the Countrey of Middlesex. And also yeelding, rendring, and paying vnto the most high and mightie Prince *Charles* Duke of Yorke; second Sonne of our said Soueraigne Lord, vnto his executors and administrators during the said terme of thirty one yeares in the same tearmes of Saint *Michaell* the Arch-angell, two parts of the said summe and summes of mony and other cleare profits afore said in 31 parts to be deuided to be alwaies paid and deliuered, at the said Pallace of Saint *Iames*, to such person or persons as our said Soueraigne Lord the King, during the Mynority of the said Duke of Yorke, and after his full age hee the said Duke shall appoint to receiue the same: And moreouer yeelding, rendring, and paying vnto *Robert* Vicount Rochester Baron of Wainick his executors and administrators in the same termes of Saint *Michaell* and at the said, Pallace of *S. Iames* one part of the said sum and sums of

D money

money, and other cleere parts to be deuided. AND as concerning the residue of the said summe and sums of money, and other cleere profits to be deuided, it shall and may bee lawfull, to, and for, the said *Simon Sturteuant*, his executors, administrators, and assignes, to retaine and keepe one part thereof to his or their owne proper vse and vses, and for the other fourteene yearely partes of the said thirty three partes of the said yeerely summe and summes of money, and other cleere yearely profits; It shall, and may be lawfull, to, and for the said *Simon Sturtenant*, his executors, administrators, and assignes, at his, and their discretion, and in such manner and forme, and by such rates and proportions, as he, and they, shall in their discretions thinke meet to dispose thereof and to expend and distribute the same, and euery part and parcell thereof, amongst such person, or persons, as shall aduenture, ioyne, be assisting, aiding or helping to the aduancing, or setting forwards of the  
workes



workes and inuentions afore-said, or any of them, and amongst such person or persons as shal be owners of the said work-houses, furnaces, hearthes, milnes, structures, engines, vessels, tests, tooles, instruments, deuises, and things before mentioned, or any of them.

And the said *Simon Sturteuant*, for him, his heires, executors, administrators, and assignes and for euery of them, doth couenant, and grant, by these presents, to, and with, our Soueraigne Lord, his heires, and successors, that he the said *Simon Sturteuant*, his executors, administrators, or assignes, shal, and wil, yearely and euery yeare, during the said terme of one and thirty yeares, well and truly yeeld, render, satisfie, content and pay, or cause to bee contented and payed, the said tenne partes of the said cleere proffits, in maner and forme afore-said, vnto our Soueraigne Lord, his Heires, and Successors, and shall, and will like.wise, during the aforesaid Terme of one and thirty yeares, well and truly yeeld, render, satisfie,

content and pay vnto the said Prince of Wales, his executors or administrators the said five parts of the said cleere profits, in manner and forme afore-said, And also to the said Duke his executors or administrators the said two parts of the said cleere profits in manner and forme afore-said, And also to the said Lord Vicount Rochester, his executors or administrators the said one part of the cleere profits in manner and forme as the same one part is formerly in these presents apointed to bee yeilded, rendered and payed to the said Lord Vicount Rochester, his executors and administrators; AND for asmuch as when the said skill, worke, and Inuentions of the said *Simon Sturteuant*, which hee by his great industry, cost and expences hath attained to, shall appeare and bee made commonly knowne, it is very likely that many persons will without the priuity of the said *Simon Sturteuant* his executors, administrators or assignes, make, frame, and

and erect the like, and peradventure hauing his Platforme, adde. therevnto some further new inuention for their gaines, or otherwise put the same in practise at their pleasure, and make the said mettles, and other materials and premises afore said, thereby reaping the fruits of the labours of the said *Simon Sturteuant*, and so defraud, both our said Soueraigne Lord, and the said Prince, and the said Duke of Yorke, and the said Lord Vicount Rochester, and also the said *Simon Sturteuant*, his executors, administrators and assignes, and such others, as shall aduenture therein, of a great part of the benefit and profit which might otherwise accrew vnto our said Soueraigne Lord, and to the said most excellent Prince, and Duke of Yorke, and to the said other parties by such skill, worke, and Inuention afore said. Our said Soueraigne Lord. therfore, fauouring the good endeouours and studies of the said *Simon Sturteuant* in the premisses, and his former seruice done vnto his Highnesse, for him, his heires and successors, for the better encouraging of

him the said *Simon Sturteuant*, his executors, administrators and assignes, in the same, and the better to enable him to vnder-goe and beare the burthen and charge thereof, and to auoide all deceit that any way may hinder our said Soueraigne Lord, or the said most excellent Prince, or Duke of Yorke, or any of the said parties aforesaid, doth by these presents declare and signifie, that his Maiesties Royall will and pleasure is, and our said Soueraigne Lord doth hereby streightly will, and command, all, and euery person or persons, of what state, degree, or condition soeuer, that they, nor any of them, during the said terme of one and thirty yeares, shall not presume or attempt, by any arte, deuise, skill, or cunning, directly or indirectly, without the speciall licence, allowance, and consent of him the said *Simon Sturteuant*, his executors, administrators, or assignes, or of his, or their deputie, or deputies, there-vnto by him, or them lawfully authorised, to make, frame, erect, contriue, or performe any kinde, or kindes of the aforesaid mettles,

mettles, and the other Materialls and things, or any of them, by, or with Sea-coale, Pitt-coale, Earth-coale and Brush-fewell, or all, some, or any of them, by all, or any the said Inuentions, or meanes, inuented or deuised by the said *Simon*, or by vsing or exercising any part, or parcell of the same, or to vtter, or sell the said mettles, or other materials, or things so made, framed, or performed, or any of them, or to make, frame, worke, erect, vse or imploy, within any the said Realmes and Dominions of our said Soueraigne Lord the King, any such or the like engins, instruments, or workes heretofore vsed in any other Artes or Sciences, for, or to the making, founding, or effecting the said mettles, things and materials, by and with Sea-coale, Pitt-coale, Earth-coale, and Brush-fewell, and all, or any of them, or any of the sayd new deuised Instruments and things, either too, or about the making or working the said mettles, things, and  
mate-

materials, as aforesaid, or to any end or purpose whatsoever, or to make or doe, any act or thing, whereby, or by meanes whereof, our said Soueraigne Lord the King, or the said most excellent Prince of Wales, or the said Duke of Yorke, or the said *Simon Sturteuant*, his executors, administrators or assignes, or other the said parties, shall or may sustaine any preiudice, losse or detriment, in the said Inventions or workes, or in any profit or commoditie which they, or any of them, may or might otherwise haue, receiue, or enioy, by meanes of the same inventions or workes, or any of them, vpon paine of the high displeasure of our said Soueraigne Lord the King, and vpon paine of imprisonment of their bodies, and forfeitures of all, and euery the said materials, instruments, and things aforesaid, which shall be wrought, framed, or made, by any person or persons, contrary to the tenour of these presents, and Royall prohibition therein, with such further penalties, paines, and forfeitures, as by the laws and statutes of the said Realms, can,

can, or may be inflicted, vpon them, or any of them, for their wilfull and obstinate disobedience, and contempt of his Highnesse said commandement and prerogatiue Royall. And if it shall happen that any person or persons, contemptuously neglecting this his Maiesties will and pleasure, in these presents declared, after notice therof giuen, shall make or acquire any kind or kinds of the afore-said mettles, and other the materials and things, by, or with Sea-cole, Pit-coale, Eearth-coale & Brush-fuell, or all, some, or any of them, by any of the said meanes and Inuentions, or any part or parcell of them or any of them, or shall frame, worke, erect, vse or imploy any such or the like engins, instruments, tooles, implements or workes, for, and to the purpose and purposes aforesaid, the same, and all, and euery of them shall bee taken and seized, by the Constable or other officer, dwelling neereest thereunto, to, and for the only vse and behoofe of our said soueraigne Lord the King, his heires and successors, AND further our said soue-  
E raigne

raigne Lord the King of his more abundant grace, certaine knowledge and meere motion doth by these presents for him, his heires and succellors, giue and grant full power and authority to the said *Simon Sturteuant*, his executors, administrators, and assignes, and his and their Deputy and Deputies and euery of them with the assistance of a Constable, Tithingman, Headborough, or any other ordinary officer in any Citty, towne, place, or places, as well within the liberties as without, within the said Realmes and Dominions, at all and euery time and times, to haue accesse and entry into any house, place, and places, where such mettles and other the premisses shall be made and wrought or otherwise layd vp contrary to his Maiesties grant, and there to search, provide, and see, that during the said terme of 31. yeares, no manner of such or the like Inuentions, workes, or practizes, of making, or erecting, any kind, or kinds, of the said mettles and other the premisses to be made, wrought, sould, vsed, or employed, within the said Realmes.



Realms contrary to the true meaning of these presents, and by all lawfull and conuenient waies and meanes to search, see examine and find out, all offences during the sayd time that shall bee committed contrary to any guifr, license, authority, commandement, prohibition, or other thing in these presents mentioned, specified, and to seaze, as aforesaid, such instruments and other things whatsoeuer, made, framed, or erected, vsed, exercised or occupied contrary to the true intent of these presents or any clause heerein cōtained. And his Highnesse will and pleasure is, and by these presents for him, his heires and successors, his Maiesty doth streightly charge and command all Iustices of peace, Maiors, Sherifs, Bailifes, Constables and al other Officers, ministers and subiects of his Highnesse, his heires and successors for the time being, that they and euery of them, during the said terme of 31. yeares, or the duplicate exemplification or the enrolement thereof, shal be aiding & asisting to the said *S. Sturteuant*, his executors, administrators, assignes & deputies & euery of them in the due execution

of all and euery the said grants, authorities, commandements, licences, priuiledges, inhibitions, prohibitions, and euery other thing in these presents mentioned and specified, or any of them. PROVIDED alwayes, that this Indenture, nor any thing therein contained, shall extend, or be construed to extend, to restraine or hinder any person or persons, for vsing, or exercising any their owne Inuentions or Artes heretofore exercised, put in vse, and priuiledged, by any his Maiesties Letters Pattents, heeretofore made and granted to them or any of them, but that it shall, and may be lawfull, to and for all and euery the said person or persons, to exercise, vse, and put in practise all and euery the said inuentions heeretofore practized, put in vse, excercised, and priuiledged by any of the said Letters Pattents, to them, or any of them, made or granted, in as ample sort, and manner, as they might, or may, exercise, practise, or vse the same, if these presents had neuer beene had, or made any in these presents to the contrary notwithstanding.

ing. IN WITNES whereof, to the one part of these Indentures remaining with the said *Simon Sturteuant*, our said Soueraigne Lord the Kings Maiestie, hath caused the great Seale of England to bee put, and to the other part thereof remaining with our said Soueraigne Lord the King, the said *Simon Sturtenant*, hath put his seale. Yeouen the day and yeare first aboue written.

Exam. *Henry Hubbert.*

The Docquet to the  
Pattent.

**T**His is your Maiesties part of the Indentures, whereby your Highnesse doth grant, licence, and priuiledge vnto Simon Sturteuant Gentleman. That hee, his executors, deputies, and assigns onely, and none other, shall and may, during the terme of 31. yeares, make, practise, and put in vse, within any your Maiesties Realmes and dominions, certaine Inuentions, Furnaces, and Instruments, deuised and inuented by himselfe, for the working, and effecting with Sea-coale, Pitt-coale, Earth-coale, and Brush-fewell, diuers things and workes heretofore done with Wood-fewell, as namely Irous, Steeles, Leads, Timmes, Coppers, Brasses, Glasse-mettles, Mines, Tiles, Bricks, Potter-ware, and such like. And there is reserued to your Maiestie vpon this grant, ten parts in thirty three parts, to bee diuided of the cleare yearely profits that shall bee made by the said new Inuentions: and to the Prince his Highnesse, fise of those parts: and to the Duke  
of

of Yorke two of those parts, and to the Lord Vi-  
count Rochester, one of those parts; and to the said  
Simon Sturteuant one other of those parts, and  
to the disburfers of the moneys for the tryall and  
effecting of the said Inuentions, foureteene such  
parts, and the declaration and discovering of this  
Inuention, is partly set down in a certaine schedule,  
which is to bee annexed to these Indentures.  
And the full and plaine manifestation thereof is  
to bee sett forth in Print, by the said Simon  
Sturteuant, before the last day of Easter terme  
next, and containeth a prouiso, that this new  
grant shall not crosse any former grant, hereto-  
fore made to any others.

And

*A Letter Pattent.*

And is done vpon signification giuen vnto mee by *Christopher Perkins*, Knight, of your Maiesties good pleasure in that behalfe.

Exam. *Henry Hubbert.*

It is his Maiesties pleasure, that these doe passe by immediate warrant.

*Robert Salisbury.*

Receiued 29. of February 1611.

An Indenture betweene the Kings  
Maiestie, and *S. Sturteuant.*

**COPPIN.**

# The Manuscript Treatise of 33 *Metallica.*

## CAPVT. 2.

*Reader.*

5.



*N* the Transcript of his Maiesties Indenture, which you haue rehearsed, there is further referrence vnto a manuscript Treatise, or certaine schedules which are annexed vnto the grant, which I pray you also rehearse vnto mee, according to the Tenour of the words in the originall.

A. The manuscript Treatise of *Metallica*, which otherwise is termed by the names of schedules in the Indenture, is comprehended in these ten Sections following.

### SECT. I.

*Metallica, the generall of all  
Metallicall Arts.*



*Etallica*, mentioned in the petition, is thus defined.

*Metallica* is an Art or Inuention, shewing how diuers things and materials, now made and attained vnto in a very chargeable sort, after the ordinary way, may be made and attained vnto after a more cheaper manner, and as with the help of common instruments, so more

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espe-

especially by diuers new deuised *Metallicall* Instruments and meanes, as in the printed treatise of *Metallica*, more at large shall bee mentioned and expressed.

From these *Metallicall* Instruments the Art is generally called *Metallica*.

The doctrine of *Metallica* cannot distinctly be known or methodically expressed, except that the Art which prescribeth precepts, general to all Arts & inuentions called *Heuretica* be first precognized.

R. Define *Heuretica*.

*Heuretica* is the Art of inuentions, teaching how to find out new, and to iudge of the old, and so forth, as followeth in the printed treatise of *Metallica*.

*Metallica*, thus generally described is of two sorts, *Ignemetallica*, which worketh with fire and hearth, or *Inignemetallica*, which vseth not the meanes of fire, for to attaine to the thing or materiall intended, yet it vseth the other *Metallicall* Instruments, wherevpon it is called more properly *Metallorganica*. *Ignemetallica*, comprehendeth many generall inuentions, which are reduced into these 7. heads, first *Metallica, propria dicta*, secondly *Pressoria*, thirdly *Terrica*, fourthly *Hydrelica*, fifthly *Hydrometallica*, sixthly *Hydropressoria*, seauenthly *Hydroterrifica*.

## SECT. 2.

*Metallica propriè dicta.*

**M***etallica*, in the proper and strict signification is thus defined.

*Metal-*



*Metallica* is an Ignick inuention, for the cheaper making of all kindes of mettles or Metalique concoctures, by the meanes of cheape firing, and other *Metallical*, instruments, wherevpon the materials and things made by this Arte, are called *Metaliques*.

*The contents of Metallica, proprie dicta, in the generall Materials which the Art maketh.*

The Metalique  
Materials  
are as

I.  
All kind  
of Met-  
tles as

1. Prepared or roasted oares, Mine-stones, or Mettle-stones beeing the fitt matter of *Metallique* liquours.
2. Irons, Steeles.
3. Leads.
4. Tins.
5. Coppers, brasses.
6. Any other new kind of mettles, which may hereafter be found beeing made and wrought after the said *Simon Sturteuant* his manner and Inuention.
7. All compounded mettles of the same kind, as Pewters, Bel-mettles, Sodars, Candle-stick-mettle, beeing made and wrought after the said *Simon Sturteuant* his manner and Inuention.

*Metallica.*

- |   |   |   |
|---|---|---|
| All kind<br>of Me-<br>talique<br>conco-<br>tures &<br>their cō-<br>creats, as | { | 1. All kinde of Sand-mettles, or<br>Ash-mettles.  |
|   |   | 2. All kind of Ammels, Beugles,<br>or such commixtures.   |
|   |   | 3. All kind of Metallique slagges<br>or cinders, if (perhaps) they<br>may be turned to some profi-<br>table vse.  |
|   |   | 4. Other compounds of the fore-<br>named concoctures, beeing<br>made and wrought after the<br>said <i>Simon Sturteuant</i> his man-<br>ner and Inuention. |

And so forth, as it shall be further mentioned and enlarged in the Printed treatise of *Metallica*.

## SECT. 3.

*Metallicall Instruments.*

**T**He Instruments and meanes *Metallicall*, which are vsed for the producing of metallique materials or things, are of two sorts, common or peculiar.

The common instruments are such which are borrowed from other trades, occupations and mysteries, amongst which wee haue especially vse of Ioyners, Smiths, Turners, not onely of their Instruments and Tooles, but also of their Emporeuticks which they ordinarily make, as Presses, Vices, Screws, Bellows, Tongs, &c. made either of Iron and Wood, or of both together.

The

The peculiar instruments are those that are of the Authors Invention ; beeing of chiefe and principall vse, for the working of *Metallicall* effects.

The peculiar Instruments of inuention, are principally of three sorts, Lenick, Plegnick and Caminick.

Lenicks are peculiar *Metallicall* instruments, which worke their operation and effect by pressing, impressioning, or moulding, and that either by thrusting or drawing.

All the kindes of these Lenick instruments, are at large described in the doctrine of the arte *Pressoria*, which is part of the Printed treatise of *Metallica*.

There is great vse of these Lenick instruments, for the tempering and commixing of Sea-coale and Stope-coale.

Plegnicks are peculiar *Metallicall* instruments, which performe their operation and effect, by their dexterous and artificiall ioynt-moouing.

All the kinds of Plegnick instruments, are at large described in the doctrine of the arte *Plegnica*, which is part of the Printed treatise of *Metallica*.

There is great vse of the Plegnick instruments for the making of Eumechanick and reformed Milnes & Bellowes.

Caminicks are peculiar *Metallicall* instruments, which performe their operation and effect, by the new kind of Furnacing and Hearthing.

All the kinds of Caminick instruments, are at large described in the doctrine of the art *Caminica*, which is part of the Printed treatise of *Metallica*.

The instruments *Metallicall*, although they are of cheefe vse in all the *Metallicall* arts, yet are they more peculiarly belonging to *Metallica*, *proprie dicta*, and for this cause they are anexed to it.

And so forth, as it shall be further mentioned, and enlarged in the printed treatise of *Metallica*.

#### SECT. 4.

##### *Pressoria.*

**P***ressoria* is a kind of Ignick Inuention, which by the meanes of cheapefieriing, and by other *Metallicall* Instruments and meanes, maketh all kinds of Press-wares or Mould-wares.

Press-ware or Mould-ware is any thing that can be made, wrought, or formed of clay and earth, not by hand, and the round table ( as the Potters vse ) but by Presse and Mould, or by pressing and moulding, and that by the help of *Metallicall* Instruments and meanes.

There be many sorts and kindes of Press-wares by reason of different figures and diuers vses vnto which they are to be applied, all which kindes are reduced to these two heades of Rude-ware and Polisht ware.

Rude-ware are such sorts of Press-ware, which after they are pressed and moulded, require no further ornament; as Prest-pipes, Prest-tiles, Prest-bricks, Prest-stones: and such like, expressed in the printed treatise of *Metallica*.

Polisht-

Pollisht-ware, are such sorts of Press-wares, which after they are pressed and moulded, doe receive further ornament or beauty, as prest-monions for windowes, and prest-columnes, and such like, described in the Printed treatise of *Metallica*.

And so forth, as it shall bee further mentioned and enlarged in the printed treatise of *Metallica*.

### SECT. 5. Terrica.

**T***Errica* is an Ignick inuention, for the cheaper making of all kinds of Burnt-earths, by meanes of *Metallicall* instruments, wherevpon the Materials made by this Art, are called *Terricks*.

*The contents of Terrica, in the severall  
Materialls which the Art maketh.*

The Terrick  
Materials, are  
all kinde of  
burnt-earth, as

1. All bricks burnt or baked, after the said *Simon Sturteuant* his manner and inuention, though made and moulded according to common order of Brick-makers.
2. All kinde of Tiles burnt or baked, after the said *S. Sturteuant* his manner and inuention, though made, and moulded according to common order of Tile-making.
3. All kind of Potter-ware, burnt or baked after the said *S. Sturteu.* his maner & Inuention, though molded according to common order.
4. All

The Terrick  
Materialls, are  
all kinde of  
burnt-earth, as

4. All kinde of limes, plaisters, alla-  
blasters burnt, after the said *Simon*  
*Sturteuant* his manner and Inuen-  
tion.
5. All kinde of Way-stones, Way-  
grauels, Way-earths, burnt and  
made after the said *Simon Sturte-*  
*uant* his manner and Inuention,  
This arte is called *Itineraria*.
6. Lastly, any other kinde of burnt-  
earths, that here-after may be de-  
uisd, as good and profitable for  
the common-wealth, being made,  
burnt, and wrought, after the said  
*Simon Sturteuant* his manner and  
Inuention.

And so forth, as it shall bee further mentioned and  
enlarged in the Printed treatise of *Metallica*.

## SECT. 6.

### *Hydrelica.*

**H***ydrelica*, is an Ignick inuention, for the cheaper  
making of all kinds of horte liquids, or li-  
quoures, by the meanes of *Metallicall* instruments,  
wherevpon the materials made by this arte are cal-  
led *Hydrelicks*.

*The*

*The contents of Hydrelica in the severall Materials  
which the Arsemaketh.*

<p>1. The Hydre-lick materials are, as</p>	<p>All kinde of Hydre-lick waters and their concreats, of which there are diuerse sorts, as</p>	<p>1. All bathing waters, for washing of the body. 2. All kind of washing, scouring waters, for washing of foule vessels, foule linen and other cloth. 3. All kinde of hot-borne, or liquor, for making of beare or ale, or any other kind of Beauoridge. 4. All kinde of hot or warme waters for dying of cloth, filke, or leathers, &amp;c. 5. All kind of hot-waters for Felt-making. 6. Lastly, all hot-waters for other trades, occupations or mysteries, as the Treatise further expresseth.</p>

<p>2. All kind of Hydre-lick vnctions, liquids, or liquours, which flame or burne, and their concreats, as</p>	<p>1. Oyles, Tallowes, Fatts, Marrowes, and such like. 2. Waxes, Rosens, Pitches, Tarres, Turpentine, brimstones, &amp; such like vnctions, gummess.</p>

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3. All

- |  |   |   |
|--|---|---|
| 3. Al kind of <i>Hydrelick</i> liquors which are mixed and compounded of waterish and vntious liquids & their concreats, as. | } | 1. All kind of Sopes, whether they bee black-sopes, sweet-sopes, or white-sopes.<br>2. Any other compound <i>Hydrelick</i> , which hereafter may bee deuised or found out, by the said S. <i>Sturteuant</i> his inuentiō. |
|--|---|---|

And so forth, as it shall bee further mentioned and enlarged in the printed treatise of *Metallica*.

## SECT. 7.

### *Hydrometallica.*

**H***ydrometallica* is an Ignick inuention, which with the same furnace, maketh at the same time, *Metalique* Materials, and *Hydrelick* Materials, both together, by meanes of *Metallicall* instruments, wherevpon the Materials, made and brought forth by this Art, are procreated as pares, twins and couples, and are called from hence *Hydrametalicks*.

*The contents of Hydrometallica, beeing an Inuention compounded of two kinds, is diuerse and manifold, according to the seuerall coupling and ioyning of the opposite simples together.*

As



- As for example } 2. Mettle-stones prepared and hot-waters.  
 1. Irons and hot-waters.  
 3. Leads and hot-waters.  
 4. Tins and hot-waters.  
 5. Glasse-mettle & hot-waters, and so other couples of opposite *Metalliques* and *Hydrelicks*.

And so forth, as it shall be further mentioned, and enlarged in the Printed treatise of *Metallica*.

## SECT. 8.

*Hydropressoria.*

*Hydropressoria*, is an Ignick inuention, which with the same fire, and the same furnace, maketh at the same time *Press-wares* & *Hydrelick* Materials both together, by the meanes of the *Metallieall* instruments, wherevpon the Materials made and brought forth by this Art, are procreated, as pares, twins, or couples, and are called from hence *Hydro presswares*.

*The contents of Hydropressoria, beeing an Inuention compounded of two kinds, is diuers and manifold, according to the severall coupling and ioyning of the opposite simples together.*

- As for example } 1. Prest-pipes and hot-waters.  
 2. Prest-tiles and hot-waters.  
 3. Prest-bricks and hot-waters,  
 4. Prest-monions and hot-waters.  
 5. And such like combination & couples.

And so forth, as it shall be further mentioned and enlarged in the Printed treatise of *Metallica*.

*Hydroterrica.*

**H***ydroterrica* is an Ignicke inuention, which with the same fire, and the same furnace, maketh at the same time, *Terricke* materials, and *Hydrelicke* materials both together, by meanes of metallicall instruments, whereupon the materials made, and brought forth by this art, are procreated as pares, twins, or couples, and are called from hence *Hydroterrickes*.

*The contents of Hydroterrica, being an Inuention compounded of two kinds, is diuers and manifold, according to the seueral coupling, and ioyning of the oppose simples together, as.*

*Burnt-earth, and hot-water.*

As for  
Example. {

1. Bricks, and hot-water.
2. Tiles, and hot-water.
3. Potter-ware, and hot-water.
4. And such like combination, & couples.

And so forth, as it shall be further mentioned and enlarged in the Printed treatise of *Metallica*.

Note also that the compound arts, being rightly and discretely performed, are farre more profitable, then

then the practise of the single arts alone, and the reason is, because that by such a compound furnace, two different workes are done at once, and in a manner with the same charge.

And these are the seuen severall heads, and kindes of inuentions: The generall whereof is called *Ignimetallica*.

There are also diuers other new Arts, and inuentions, which worke not with fire, al which arise (in respect of the meanes and instruments) from the former, And therefore, the generall of them all, is called *Ignimetallica*, or *Metal-organica*, as was specified before.

# SECT. 10.

## *Metal-organica.*

**M***etal-organica* is an inuention Ignicke, for the cheaper making, & acquiring of diuerse profitable things, workes, and materials, by the meanes of the *Metallicall* instruments, fire onely excepted, whereupon, the things made and acquired by this art, are called *Metal-organickes*.

*Metal-organica*, comprehendeth many worthe inuentions, whereof these seuen are principall, euerie one of them making royalties a peece, excepting the wood pleite iarr.

First, then there is a new art and inuention, *Metal-organicke*, with cheifely, by meanes of *Pleannicke* instruments, maketh a new kinde of water-milnes, wind-

milnes, and winde water milnes, and a new kinde of horse-milnes, and hand-milnes, for the grinding of corne, tanners barke, brazill, for the sawing of woods, making of oiles, battering of Irons and coppers, and for tuckeage, and fullage of wollen cloath, or yeallow oyled leathers, or for any other vse or purpose what-soeuer, which other milnes are ordinarily turned into. And these *Metallorganicke* milnes, are lesse chargeable to make, set vp, keepe and repaire, and yet more necessarie and conuenient, then the ordinarie sort of milnes, which be now in vse.

Secondly, there is another new art and inuention, *Metallorganicke*, which chiefly by meanes of *Plegnicke* instruments, maketh also an artificiall kind of water-woke, for the abundant raising and mounting of water, after an easier order, then those that are already in vse in the common wealth.

Thirdly, there is another new art and inuention *Metallorganicke*, which chiefly by meanes of *Plegnicke* & *Lenicke* instruments, ioynly together, maketh singular, effectuall and most excellent deuices. and meanes for the dreyning and drying of marshes, fennes, and low-grounds.

Fourthly, there is another new art and inuention *Metallorganicke*, which chiefly by meanes of *Plegnicke* and *Lenicke* instruments, ioynly together, maketh singular, effectual & most excellent deuises & meanes for the ridding, clearing, and mounting of waters out of Colepits & Minerals, the like was neuer in vse or practice before.

And

And here the Ballance engin, made of presswares, is of great and worthie good vse.

Fiftly, there is another new art and inuention *Metalorganicke*, which chiefly by meanes of *Plegnicke*, *Lenicke*, and *Caminicke* instruments, ioynedly together maketh singular, effectuall and most excellent deuises for the firtelizing, hartening, and improuing of pasture ground, corne ground, and all other barren grounds whatsoeuer.

Sixtly, there is another new art and inuention *Mettallorganicke*, which chiefly by meanes of the *Plegnicke* instruments, maketh very effectuall and benefici-all instruments of fishing, as new kinde of Burces, new kinde of Nettage, and Bateage, by which new deuised meanes great aboundance of fish may be caught with farre lesse charges, and in shorter time, then by the ordinary arts of fishing.

Seuenthly, there is another new art and inuention, *Mettallorganicke*, which chiefly by meanes of the *Plegnicke* instruments maketh diuerse kinds of housechould moueables, as artificiall Dores, Windowes, Curteines, Presses, Tables, Stooles, Beadsteds, Hangings, Chests, and diuers other things, handsomer & more conuenient then heretofore is done by the ordinarie way of other stuffe.

Where note, that the Materials made by this Mechanicke art, are called wood-pleits.


And so forth, as it shall bee further mentioned and enlarged in the Printed treatise of *Metallica*.

CAP.

## CAP. 3.

*Heuretica defined and deuided into his reall and  
Technick parts.*

R.

6.  IR you hauing thus set downe both the Transcript of his Maiesties Indenture and the Schedules annexed, I pray you proceed more fully to entreat of the doctrine of *Metallica*, which seemeth to be handled in the next place.

A. It appeareth out of the first Section of the Schedules, annexed to the Patent, that the doctrine of *Metallica* cannot distinctly be knowne or Methodically expressed, except that the art which prescribeth precepts, general to all arts and Inuentions, called *Heuretica*, be first precognized.

R. 7. Define therefore breesely *Heuretica*.

A. *Heuretica* is the Art of Inuentions, teaching how to find out new, and to iudge of the old.

R. 8. What deuision is there for *Heuretica*?

A. The doctrine of Inuentions hath two parts, Reall and Technick.

R. 9. Define the Reall part.

A. Reall is the first Part of *Heuretica*, which treateth of the Instruments and Reall things, which belong to the Inuentions.

R. 10. How is the reall part deuided;

A.

A. The Reall part spreadeth it selfe into two branches, whereof the first is called Organick, and the other Emporeuticall or Polecall.

R. 11. Define the Organick part.

A. The organick is a part of *Heuretica*, which setteth downe the meanes and Instruments, whereby the work of Art, intended, is brought forth, made and effected,

R. 12. Define the Emporeuticall or Poleck part.

A. The Emporeutick is an Organick part of *Heuretica*, which treateth of the worke of the art, which are commodities and wares for vse and sale, wherby profit is raised.

Where note that the comodities, wares and things of euery inuention, for generall vse, are called from this part Emporeuticks.

Note also, that Emporeuticks, being things artificiall, are also firstly called materialls, but if they be naturall, they are called things acquired by the art. So fish and foule are the Emporeutick things, acquired by the art of fishing and fouling, but lead and Iron are Emporeutick Materials made & wrought by *Metallicque* art.

R. 13. Define the *Technick* part.

A. The *Technick* is that habituall part of *Heuretica*, which treateth of the dexterous habit and faculty wherewith all the Artizands are to be quallified and endowed, who are apointed to make the Emporeutick workes of Inuentions,



## CAP. 4

*Another partition of Hewretica  
and an Invention Mechanick defined.*

R.

14 **W**Hat other diuision is there for *Hewretica*?

A *Hewretica* in respect of the worke intended is diuided into two parts, namely, into the Scientiffick part and Mechanick part.

R. 15. Define the Scientiffick part.

A. The Scientiffick is that part of *Hewretica* which prescribeth precepts generall to all liberall arts, the end of which Arts, is cheefely Science or knowledge and not any reall visible worke, or sensible thing.

R. Define the Mechanick part.

A. The Mechanick part is that part of *Hewretica* which prescribeth precepts generall to all illiberall arts, the end of which arts is cheefly a reall visible work or sensible thing.

And the Invention in this kind is called an Invention Mechanick.

R. 16. Define therefore an Invention Mechanick.

A. A Mechanick Invention is the art of the Inuentor, which by effectuall Instruments and meanes bringeth forth some new visible or sensible worke good and profitable to the common-wealth.

So



So the Inuention of printing is the skill and art of *Faustus Gutttembergius*, which mistery (by the effectual deuised means of the Presse, the Incke, the Characters and paper) bringeth forth impressions and Bookes, which Mechanick woikes are profitable and good for mans vse.

Where note, that, First the Mechanick Art, secondly the Instruments and meanes, thirdly the woike of the art, made by those Instruments, and meanes, are all called Mechanicks, and are all Inuentions in respect of the Author that deuised them.

R. 17. Expreffe further euery word and clause of this definition, to the intent that I may the better vnderstand them.

A. Your desire shall bee satisfied. First then to speake of the thing defined, you must note that any other deuice, course or way which bringeth forth no externall or Materiall woike, are also in respect of the Inuentor tearmed Inuentions.

So the first discouery of the west Indies by *Columbus*, (in respect of him) is fitly called his Inuention, and the turning point of Nauigation called the Cape of *bona Sperança* is *Gaymus* his inuention the like may be said of *fretum Magellanicum*, and *fretum Danies*, which although they are laudable Inuentions, discouered by ingenious & venturous persons, yet cannot they be said to be Mecanicks. because they produce or leaue behind them Mechanick work, nor had any Mechanick instruments made by hands of man directly,

and of purpose for the performance of them, for these Mechanicks are onely proper to these kinds of inuentions which wee treat of.

R. 18. Wherefore call you an inuention a Mechanick Arte.

A. To put a distinction betweene these inuentions Mechanicall, and other inuentions of the liberall Arts and Sciences, of which sort are Logick, Rhetorick, Grammer, and the Mathematicall sciences, all which had their first Authours and Inuentors.

R. 19. Wherefore say you the art of Inuentioner.

A. To shew that there is no Inuention without relation to the Inuentioner.

R. 20. Why then it seemeth that all Arts, sciences, mysteries, trades, crafts, things and deuises, which are now extant in the common-wealth, are, and may be called Inuentions.

A. Yea verily so they may, if wee respect the Inuentioner, and first Authors of them, but if we respect the persons that vse and put in practize the said Inuentions at the second hand, as we say, such as are the Artificers, Tradesmen and others that make the said Mechanick workes, in respect of these secondary persons they are called Arts, Trades, Crafts, Sciences, Misteries, Occupations, Professions, and lightes, &c.

So the printing, as also the Presse, the Paper, the Characters, together with the works done, as impressions, bookes, and vollumes, in respect of *Faustus* are his Inuention, but in respect of Printers, which now

a dayes worke by his inuention, Printing is rightly called an arte, trade, or mistery, the like may bee said of all other Mechanicall trades now extant in the common-wealth, and of all other profitable inuentions, which here-after may be brought to light in the common-wealth.

R. 21. To what vse serueth the knowledge of this.

A. This fitly serueth to refute the erroneous folly of such shallow simple persons, which cannot abide any new inuention, which this our age bringeth forth, they vtterly distaste both the proiects and Inuentors, they forsooth (as they say) will giue no assistance, they will not meddle nor deale with them, they will not vse their new worke, though neuer so good and profitable, nay they say more, after their fond fashions, it will neuer prooue good, or come to passe, with a hundred such like speeches, tending to the dispraise both of the Inuentioner, and of things deuised by him, but being demanded for their reason, they haue none to alleadge, except onely a womans reason, like vnto that of the Epigrammatist:

*Non amo te Volusi, non possum dicere quare,  
Hoc tantum possum dicere, non amo te.*

But if these men, who so much spurne at inuentions, did well consider, that all ancient Mechanick trades, occupations, professions and workes, which now are in vse in the common-wealth, were new at the first, and had their beginning and infancy, and how they

were then the peculiar inuentions of some ingenious wits, who trauelled with all their endeouours to bring forth the said inuentions, to the good of that age wherein they liued. If I say they did well, consider and ponder this, they would not be so auerſe and bitter againſt laudable, and good proiects, brought forth now a dayes, for with as good reaſon they might enueigh againſt printing, ſhipping, milning and buildings, againſt the ordinary waies of making of ſalts, alloms, copprefſes, and ſaultpeeter, againſt the trade and art of making of hats, and knit ſtockings, ſhooes, bootes, and apparell, againſt the art and trade of making of ſaddles, carts, ploughes, harrowes, and againſt the art of melting, founding, and caſting of mettles, of forging, hammering, and battering of irons, braſſe, peuters, ſiluer, and gould; and finally againſt all other trades, occupations, vocations, and profeſſions in the common-wealth, as ſo baſely to regard and eſteemae the profitable and new inuentions of our daies. Again, in ſcorning, and con-temning of profitable buſineſſe of late inuention, they ſet themſelues not onely againſt man, but alſo againſt the ſpirit of God, who is the authour of the ſaid gifts, and firſt worke of them in man, as it is expreſſely taught in the 31. of *Exodus*: in the example of two worthy inuentioners, and artificers, the wordes of the text are theſe. Behold (ſaith God to *Mofes*) I haue called by name *Bezaleele* the ſonne of *Vri*, the ſonne of *Hur*, of the tribe of *Iuda*, whom I haue filled with the ſpirit of God in wiſedome and  
in

in vnderstanding, and in knowledge, and in all workemanship, to finde out curious workes, to worke in gold, in siluer, and in brasse. Also the Art to set stones, and to carue in timber, and to worke in all manner of workemanship. And behold I haue ioy-  
ned with him *Aholiab*, the sonne of *Abisamah* of the tribe of *Dan*, and in the hearts of all that are wise-  
hearted, I haue put wisdom to make all that I haue  
commanded thee.

Out of which words of holy Scripture it is apparent that all Mechanicke Arts and Inuentions, as well as the graces of saluation, are the peculiar workes, and gifts of Gods holy spirit in man, which bloweth where, and when he listeth, and powreth out his spirit, vpon some men in euery age.

CAP. 5.

*Transient instrumentall  
meanes.*

R. 22. In the definition of the Organicke part, you say that the worke is produced by instruments and meanes, I would therefore know of you, how many kindes of instruments and meanes there are to effect a new businesse.

A. The Organick things for the effecting of a new Inuention are of two sorts, Permanent or Transient.

R. 23. Describe the Transient Instrument and meanes.

Instruments

A Instruments and means are said to be Transient, when in respect of their vse, they serue but once for that imployment for which they were appointed, so fuell and oare are Transient, because they wast and consume in that Materiall which they make.

R. 24. How many kindes are there of this Transient sort

A. Two: Efficientall, or Materiall.

R. 25. Describe the Efficientall Instruments.

A. Efficientall are such Transient Instruments and meanes as vanish and consume away in their first vse, whilst they are performing their operation and efficiency to produce the pretended Mechanick work, as namely the fuell or fiering in euery businesse.

R. 26. Describe the Materiall Instruments.

A. Materiall, are such Transient Instruments and meanes wherof the Instruments consist and are made, not vading or vanishing away, but remaining transformed or altered in the substance of the thing effected, as namely the stuffe and matter of euery Mechanick instrument.

## CAPVT. 6.

### *Permanent Instruments and meanes.*

R.

27. **I** vnderstand well the Transient instruments, with their seuerall kindes, pray you describe the permanent.

A. Instruments and meanes are said to be permanent when as they serue to performe their operations diuerse

diuerſe times (to wit) in this thing, in that thing, and in many others, of this ſort are all tooles in euery trade, all kilnes, furnaces, ouens, hearthes, in euery trade. If we reſpect the firſt making and creation of permanent inſtruments, then muſt we conſider their efficientall, and materiall meanes alſo.

R. 28. How many kindes are their of this ſort.

A. Two, for theſe permanent meanes, are either perſonall, as namely the workeman and artificers in euery action; or elſe impoſonall, of which ſort are all other inſtruments of the buſineſſe.

R. 29. How many ſorts of workemen are there for euery inuention.

A. Two, primary, and annuall, primarie as the inuentioner to guide, and artificers to make, the annuall are the daily workemen which make the Mechanicke.

R. 30. How many artificers are neceſſarie for the primarie, and firſt foundation of mechanicke inuentions.

A. Theſe ſubſequent are moſt neceſſarie, as namely; Ioyners, Carpenters, Smithes, Bricklayers, Maſons, whereunto in ſeueral inuentions, diuerſe other Artificers are to be added, as occaſion ſerueth, as Shoemakers, Glouers, Bellows-makers &c.

R. 31. How many ſorts of annuall workemen are neceſſarie for the yearely managing of an inuention.

A. Two, the maſter and overſeer, or his apprentices, or ſeruants, which make the mechanicke worke, And ſecondly, the repairationers, which maintaine and mend the inſtruments and meanes which at the

first they made and formed.

R. 32. What distribution haue you for impersonall instruments.

A. The impersonall instruments, are either generall or speciall, the generall is the worke-house where in other instruments doe their operations, worke and employment, and vnder this head we comprehend the ground, place, yard, or roome, where the *Mechanicke* businesse is wrought or done. The speciall impersonall instruments, are all other impersonall instruments, besides the worke-house or place. Amongst which impersonall instruments furnacing may here bee briefly touched as being a necessarie instrument in most inuentions.

R. 33. How define you a furnace.

A. A furnace is the artificiall receptacle, which beareth and containeth fewell and the fire.

R. 34. How may kindes are comprehended vnder this head of furnacing.

A. Diuerse, as namely all kinde of ouens, lamps, stoues, kilnes, hearths, all which we generally comprehend vnder the name of Furnacing.

### CAP. 7.

*Instruments and meanes procured and meerely operative, monies and charges of a businesse.*

R.

35. What other distribution haue you of instruments, and meanes of a busines, in respect of charges.

A Organicke



A. Organicke meanes of a Mechanicke, are either procuring, or meere operatiue.

The procuring meanes is monie to be impended and disbursed in charges.

It is the instrument of instruments, and meane of meanes, procuring all other instruments and meanes meere operatiue, and when once they are procured and provided by it, it measureth their worth and valuation, whereupon *Aristotle* calleth it, *communis mensura omnium*.

R. 36. What is generally to be knowne and considered, concerning the monies to be disbursed in a busines.

A. Monies or charges of a busines, are either primarie and once impended, or else annuall, and at certayne times to be renewed.

R. 37. What differēces are their of primary monies.

A. Primary monies are either disbursements about the first foundation, or about the tryall.

R. 38. What call you fundamentall charges.

A. Charges of foundation are all such primary monies which are to be disbursed at the first erection or setting vp of a new businesse, or of grand Mechanicks, in some one conuenient place, whereby a worke-house is furnished with all permanent necessary tooles and instruments.

R. What call you charges of tryall.

A. Charges of tryall are the primary monies which are bestowed and disbursed about the tryall and experimenting of an inuention or new businesse.

R. 40. Wherein consisteth the chiefe charges of tryall.

A. The triall monies are to be disbursed first about the Theoricke instruments, and meanes of an inuention, that is the whole description of an inuention. Whether it be by way of manuscript writings, or printed treatises.

Secondly, about the moddles of an inuention, whether they be superficial, or reall, motionall or directionall.

And lastly about the erection and foundation of the Protoplast, vnto which al the other grand mechanicks are to be conformed.

R. 41. Concerning the charge of tryall, what is fittest for an Inuentioner to demand of them that are willing to deale in a new businesse.

It is the wisest, safest, and most credible course for the Inuentioner, not to aske vnder-hand, whereby he shall be driuen to repaire to them againe the second time, but rather at the first let him aske and agree for more monie, and not for lesse then will serue the turne.

R. 42. What other chiefe rules ought an Inuentioner carefully to obserue in the practise and tryall of any new inuention.

A. That he may make tryall and put in practise his new deuise and inuention with good successe and to purpose, let him alwaies well remember these subsequent rules.

1. Make things stronger, then that exact strength which

which the thing is to haue.

2. Make things greater then that exact greatnesse which the thing is to haue.

3. And therefore make things longer, broader, thicker and wider, then that exact length, breadth, thicknesse and widenesse that the thing is to haue.

4. Make more in number then that exact number which is required to serue the turne.

5. Take longer time for a new busines then will serue the turne.

6. For qualities as hardnes, softnes, drinesse, moistnes, stiffnes, toughnes, &c. obserue this Rule.

Let things be tempered to a greater quality then will serue the turne.

7. Yet if the Inuentioner can make the thing in the exact truth, then let him do it accordingly, for this is alwaies least chargeable.

R. 43. In the first triall of things can the Inuentioner perfectly hit on the exactnesse of euery particular instrument and means belonging to the new busines.

A. The Vndertakers and dealers are to expect some losse in triall of new busineses, be the Inuentioner neuer so perfect in his Theorick, for although he do his best indeauor, and giue perfect directions to his workmen and Artificers, yet they will often faile and erre in their worke, by which meanes the instrument being experimented and put to triall, becometh

insufficient, for the appointed vse, and many times the Inuentioner in some one point may faile himselfe; for which there is no helpe but only to redresse and amend the fault in the instrument, or else to make a new instrument in the others stead, neither of which can be done but with further charge.

R. 44. What call you the Annuall charges of an inuention.

A. Annuall, are such monyes which from time to time, vpon occasion, are bestowed after the first Plantation vppon the repairing, maintaining, and continuing the said primary instruments belonging to the said new businesse.

### CAPVT. 8.

*Inuentions intermixt and pure  
moddle, Protoplast and  
grand Mechanick  
defined.*

YOU haue handled the doctrine of the generall meanes and Instruments of Inuentions, proceed I pray you to speake of the differences and diuers kindes of Inauentions, and First therefore I desire to know.

R. 45

R. 45. How many sorts or kindes of Inuention are there being compared or considered one with another?

A. Two, An Inuention is either pure or intermixt, an Inuention is said to bee pure and entire within it selfe, when as none of the parts essentiall are common to any other Inuention for the same vse.

Intermixt when as some of the parts are found in some other former inuention.

So a Windmill is an intermixt Inuention, because some of the partes, as namely the Milne-stones, the rong-wheels and the Cogg-wheels were first extant in a water-milne or horse-milne and quernes.

But a hand-Querne was a pure and simple Inuention because none of the parts thereof were formerly extant in any other Mechanick.

And so printing is a pure and simple Inuention, because none of the essentiall parts thereof were taken from any former Inuention, where they were applied to the same vse.

Where note that the common parts of an intermixt Inuention are to be esteemed as proper and peculiar to the same Inuention, when as they are conioyned and mixed in with other new things Instruments and meanes, which are the essentiall parts of the new deuise.

R. 46. What other distribution haue you of an inuention in respect of magnitude.

A. In respect of greatnesse or quantity, there are  
three

three sorts of inuentions, namely the Moddle, the Protoplast, and the grand Mechanick.

R. 47. Describe the Moddle.

A. The Moddle is a Mechanick, which onely representeth and decyphereth, in some little platforme, the true part and lineaments of the Mechanick inuention, beeing insufficient to yeeld any Emporeu-tick vse of the inuention.

So the Moddle of a winde-milne, representeth the sailes and other parts of Fabrick and structure, but grindeth no corne.

Where note, that some times the moddle is to be made greater then the Mechanick, especially in small curious things, as in a watch, and such like.

R. 48. How many sorts of moddles are there.

A. Two, Superficiall and Reall.

The Superficiall describeth onely the parts and lineaments in paper, bordes or past-bords, by limning, drawing, or painting, shewing no action or operation, nor corporall dimensions of the parts.

A Reall moddle is that which sheweth euery part of the greater Mechanick, in a true and liuely (though little) proportion, hauing his parts fitted for motion, action, or operation: Neuerthelesse it is not so effectuall or fully vse-full, beeing onely representatiue, as was touched before.

So a litle ship, which you haue hanging vp in a marchant's house, is the Reall moddle of a grand ship or sea vessell, because it representeth euery part and action thereof.

R. 49.

R. 49. What is the principall vse of a Reall Moddle.

A. The cheefest vse of a reall moddle is that the Inuention may thereby more perfectly and exactly direct both himselfe, and also guide his workmen for the finishing of any grander Mechanick of the same kind, thereby the better to produce and bring forth the Theorick conceiued in his mind into the grand Reall Inuention.

So the vse of a small reall moddle of a Wind-milne serueth uery fitly to direct both the Inuentor himselfe and likewise all his Carpenters and other workmen, to proceed infallibly to build and set vp a reall and grand windmilne intended to be made.

R. 50. How many sorts of reall moddles are there.

A. There are two sorts, for either they are meereley directionall or also motionall.

Directionall is that moddle which is made only to direct and guide the Artificer in the dimensions of all the parts, as also for to direct them for the kinds of the matter and the stuffe that they are to haue to make the engin intended.

R. 51. What is the fittest and cheapest stuffe to make a directionall moddle of.

A. Past-boordes and reedes are the fittest either for Iron-works or woodworks, wherof the Past-bords are in stead of boordes, plancks and bed-sides.

And the Reeds are to represent round Cylindriack timber, as also other square timber, as namely single  
K quarters

quarters, double quarters, puncheons, rafters, transomes &c.

So that of these the Inuentioner may fitly and speedily make and contriue the fabricke and structure of any directionall moddle.

R. 52. What call you a motionall moddle.

A. A motionall is that moddle Reall which is made compleat in euery part, hauing his true vse, operation and motion, as in the grander *Mechanickes*, yet hauing no Emporeticke commodity, but onely for shew and tryall, and not for sale and vse.

There are three degrees in this motionall moddle, the meane moddle, the lesser then the meane, the greater then the meane.

The meane moddle is a motionall, which hath his magnitude and greatnesse betweene the other extremes, being the least chargeable to be made. And it is alwaies greater then the lesser motionall, and lesser then the greater motionall: and there is but one meane moddle to be found in the progressiō of the same degrees.

Where note that it belongeth principally to the Inuentioners skil and care to set forth the dimensions and parts of his moddle, intended with the least expence of charges that may be, and in the easiest and rediest manner for his workemen to vnderstand and imitate, or else he hitteth not vpon the meane moddle, but vpon some other extreame.

R. 53. Define the Protoplast.

A. The Protoplast is an Inuention mechanick which first is set vp of that kind, and seruing to profitable Emporeticke



Emporeuticke vses, hauing all the principall parts, actions, and perfections, which all other subsequent grand Mechanicks ought to haue of the same kinde, which afterward are to be made and framed by it.

So the first windmilne that the inuentioner euer set vp to grinde corne was the Protoplast and example from whence all other wind. milnes sprange and were deriued, the like may bee said of the first of euery kinde of Mechanicke, as of *Faustus* his first Printing Presse, &c.

R. 54. Define a grand Mechanicke.

A. The grand Mechanicke, is that which is set vp after the forme and tipe of his Protoplast, for the same vse and purpose, onely differing from the Protoplast in greatnesse, or with some profitable additions which later experience hath taught.

So the Windmilnes in More-fields are Mechanicks of that kinde of inuention, for they are builded after the Archetype of the Protoplast which the inuentioner first inuented and erected, seruing to the same vse of grinding of corne; they differ onely in this, they haue a deuise called the Crampe, which will sodenly stay (in the face of the storme) the violent motion or circumgyration of the wheelles, vntill the sales are taken downe or fardled vp.

## CAP. 9.

*Inventions Heterocrefious and Homocrefious,  
primatiue, and deriuatiue, defined.*

*Reader.*

55. **W**Hat other distribution haue you of a Mechanick inuention, considered one with another.

A. Inuentions considered comparatiuely one with another, haue two differences, for they are eyther *Heterocrefious*, or else *Homocrefious*.

*Heterocrefious*, are inuentions which produce different Mechanick workes, wares and commodities. So milning and slipping are two *Heterocrefious* inuentions, because the worke of the one is meale or flower, and the worke of the other is carriage or transportage.

R. 56. Define *Homocrefious* Inuentions.

A. *Homocrefious* inuentions, are such which produce and bring forth Emporeuticall workes for the same vse.

So a horse-milne, a water milne, a wind-milne are *Homocrefious*, because they all grinde flower, though after different manner and wayes.

R. 57. What distribution haue you for *Homocrefious*.

A. An Inuention *Homocrefious*, is either primatiue or deriuatiue, the primatiue is that which was the  
first

first in vse in the world of the same kinde.

So a Pestle and a Morter is a primatiue inuention, because it was first vsed for to beat and bruse corne into meale and powder, and at this day it is still vsed to grinde eaten grotes, but a hand:querne, a hors-milne, a winde-milne, and a water-milne, are Inuentions deriuatiue, all which were found out in succession of time, long after the pestle and the mortar.

R. 58. Giue some other illustrious examples of primatiue and deriuatiue inuentions.

A. In matters of literature, the Art of writing with the pen, is a worthy primatiue inuention, both for writing and reading, found out by *Moses*, that learned Lewite and thrice holy Prophet, the deriuatiue inuention, whereof is Printing, a far more exquisite mystery deuised of late yeares by *Faustus Guttenbergius*.

So in husbandry the Spade, the Rake, and Shouell, was a worthy primatiue inuention of *Adam*, for the tillage and sowing of the ground, according to that ancient and old prouerbe.

*When Adam digged, and Eue span,  
who was then a Gentleman.*

But the Plough and the Harrow are their deriuatiue inuentions, which for the vses of husbandry doe farre exceed them, for by them more worke of tillage of the ground may be done in one day with the same charge, then could be done by their primatiue inuentions in twenty dayes.

Againe the Barrow which carrieth burdens from places is a primatiue inuention, but the Cart with wheeles is a far more excellent deriued Mechanick, because it carrieth more in one day, then the primatiue can doe in ten dayes with the same charges.

And this Inuention of round wheeles to draw and carry loades with a small strength vndoubtedly was grounded on this Geometricall axiom, *Circulus tangit planum unico puncto*, for if the wheeles should haue beene made square, trencher wise, or in any other poly-angle, forty horses would not so easily draw them beeing laden, as two doth now with both speed and ease. And thus much for the example of primatiue and deriuatiue Inuentions.

Where note, that the deriuatiue must alwayes bee of a greater vse, and doe more good in the common wealth, then the primatiue, or else it is not to bee receiued.

Note also, if there be many deriuatiues in the same kinde, the latter inuention must alwayes better the former, and beeing all of them compared and rancked with their primatiue, they make an Inuentionall progression, one exceeding an other, in goodnesse and vse, amongst which, the last of all ought to bee the best, and is therefore called the Eumechanick in the progression of that kinde.

R. 59. Giue some examples of Inuentionall progression.

A. I will satisfie your desire, and first in matter of husbandry, for the making of bread, which mainteineth

neth the life of man, there is a progression of these five Inuentions.

First the Mortar, secondly the Hand- querne, thirdly the Horse- milne, fourthly the Water- milne, fifthly the Winde- milne.

To which if we adde the inuention of the Plegnick Milne, it maketh vp the sixth, and is the Emmechanick of that kinde.

Secondly, in hose or stockings, there is a progression of three, cloth or kersey stockings, which were first in vse: Secondly in knit stockings with Needles: Thirdly, and lastly, in knit stockings with loome, which is a late Inuention of one Maister Lee.

Thirdly, in vessels of drinking, there is a large progression. For first, to pretermitt the cup of the hand, out of which *Adam* and *Gedeons* three hundred Souldiers dranke, *Indg.* 7.6. There is secondly the earthen Pitcher, which the Samaritane woman had at the Well: and the third roome came vp the vse of the black Leather Iacks, an ancient drinking vessell of our native countrymen, and the fourth place sprung vp the vse of Tankards and Wodden Kans, in the first out of Hornes, in the sixth Siluer, Gould, greene- Glasse, Venice glasse, and Peuter.

All inuentions, for the most part, of latter times, are deriuatiue, & the Inuentioners are to make choice of this kinde, and needeth the lesse to spend his time about any primatiue denice.

*Inuentions organicall and emporeuticall: The  
parts and adiuncts: The Theoricke and Prac-  
ticke of an Inuention Organicall.*

R.

60. **V**What other distribution is their of an inuention Mechanicke.

A. An inuention Mechanicke, in respect of vse is either *Organicall* or *Emporeuticall*.

An Inuention *Organicall* is that artificiall fabricke or structure compacted of all impersonall instruments and meanes which make the Emporeuticke comodities.

So the windmilne considered in it selfe is the compact, structure or fabricke, which comprehendeth all permanent instruments and meanes which produce, yeeld, and bring forth meale or flower.

But the flower and meale thus ground and made by the windmilne *Engin* is fitly called the inuention emporeuticall.

So likewise the whole structure and complement of all the permanent, and impersonall instruments, and meanes which make vp the Ferricall furnace, is termed the inuention.

R. 61. What differences haue you for the parts of an Inuention *Organicall*.

A. The parts of an inuention *Organicall*, are either essentiall or inessentiall, comon or peculiar *Organicall*.

But

But the earth-coale iron which is made by the said complement, and panoply of instruments is fitly called the Emporeuticall inuention of the Author or Inuentor.

R. 62. Describe the essentiall parts of an inuention *Organicall*.

A. The essentiall part of an inuention *Organicall* is any maine and chiefe member, whereby the engin is well enabled to performe his worke and operation, which being lacking, the other parts of the engin become ineffectuall, and inoperative, for the producing the *Emporeuticke* intended.

So a windmilne consisteth of all his essentiall parts, besides his crosse sales is ineffectuall and not able to grinde corne, the like may be said if it lacke a cog-wheele, a ronge wheele, a milne-stone, or any other essentiall part.

R. 63. Describe an inessentiall part of an Inuention *Organicall*.

A. An inessentiall part is an additament, which indeede somewhat bettereth and helpeth the Inuention, when it is added to the maine complement of the *Machin*, or *Engin*, yet being lacking and not vsed, it taketh not away the operation or worke of the inuention or engin: of this sort, is the crampe of a windmilne, which is a very good and worthy addittament, found out by some ingenious Milner of late, and it is able to hold the crosse sales immoueable, euen in the very blast of a storme.

L

Yet

Yet wind-milnes which haue not nor had not this later addition of the crampe doe daily grinde corne aswell as other wind-milnes which are there withall furnished.

But in a storme they are driuen to this inconuenience: hat three or foure must presently goe downe to turne their crosse sailes out of the winde, that they may take downe and fardle vp their sailes.

So likewise the brasse plate and the roulung girth are necessarie and conuenient additions in the engin of the Printing Presse, and both of them were of late yeares first deuised (as it is said) by one Maister *Harnie* an ingenious Printer in London.

Yet before they were added or vsed in the mistery of Printing, *Faustus* his inuention was absolute and compleate of it selfe.

R. 64 Describe the common parts of an inuention Organicall.

The common parts are such as are borrowed from other trades, occupations and misteries formerly inuented and in vse, and now adioyned and mixed in, amongst the new parts of the Inuention.

R. 65. What call you the peculiar parts of an inuention.

A. The peculiar parts are such as are proper and of the essence of the inuention, not being taken from any other Mechanicke, formerly in vse.

So the sayles, the milne-post, the spurs of a wind-milne are his peculiar parts, but the cogge-wheels,  
 longe.



ronge-wheeles, and milnestones are common parts as being assumed and borrowed from the horse-milne and water-milne formerly in vse.

R. 66. What differences haue you for the adiuncts of an inuention Organicall.

A. The adiuncts of an inuention Organicall haue the same differences, which the parts of an inuention had before.

For the adiuncts are either essentiall or inessentiall, common or peculiar, the nature and distinction of which differences may be easily conceiued and vnderstood by the descriptions of the former feuerall parts.

R. 67. What other differences haue you for the adiuncts of an inuention Organicall.

A. The adiuncts of an inuention Organicall are also necessarie or lesse necessarie.

Necessary adiuncts are all such which of necessitie are to be vsed for the producing of the intended Mechanicke.

And the lesse necessarie are all such which brings some small helpe to make and bringe forth the *Em-porenticke*.

R. 68. What distribution haue you of an inuention Organicall.

A. An inuention is said to haue a Theoricke or a Practicke.

R. 69. What call you Theoricke Inuention.

A. The Theoricke of an inuention is the declaration of the contents thereof by a plaine and familiar discription, and that either by manuscript

writings or by printed treatises.

R. 70. What Arguments are cheefe for the description of an Inuention.

A. The arguments of the parts and adiuncts, or the Arguments of Instruments and meanes.

R. 71. Do the parts, and adiuncts, and Instruments, and meanes, expresse diuers meanes.

A. No, for by parts and adiuncts are vnderstood the selfe same things, which are meant by instruments and meanes, but yet in diuers and different respects: for they are called parts and adiuncts in respect that the Mechanick Engin subsisteth & consisteth of them, but in respect of the Emporeutick, which is made by them, the said partes and adiuncts are fitly called Instruments and meanes.

So a printing Presse hath his seuerall parts, wherpvpon it doth consist, as the screw, the nut, the pare-tree and the chase, &c. it hath also his adiuncts belonging to it, as the Inck and the Inck-bals &c. which said parts and adiuncts of the Presse considered, with the printed papers, bookes and impressions which are the saleable Emporeutick workes. I say in this respect they are called Instruments and meanes whereby printed Bookes are attained vnto.

R 72. Define a practick of an Inuention.

A The practick of an Inuention is that which is made in reall parts and adiunct, according to the description of the Theorick of an inuention.

So if you describe an Iron furnace by euery part and adiunct which belongeth therunto, such a description

tion is called the Theorick of a Furnace, but afterward if you make a real Furnace, either of moddle, stufte or of brick, clay, or earth, according to the description & Theorick proportions, then such a Furnace is called the practick of a Furnace, the like may be said of any other Mechanick or Engin.

R. 73. What cannons haue you of an inuention in respect of the Theorick.

A. The Theorick of an Inuention is to be described by his parts and adiuncts that other mens labours and indeauors bee incroached vppon or forestalled thereby.

**CAP. II.**

*An Inuention triable and vntriable conformable and inconformable, Royall and Coppy-hold.*

R.

74 **W**Hat other kindes or sorts haue you of an Inuention.

A. An Inuention is two fould, An Inuention of discouery, or an inuention of experiment, or an Inuention is triable, or vntriable.

R. 75. What call you a triable Inuention.

A. A triable Inuention is an inuention whose worth and goodnesse cannot certainly appeare before trialls and experiments be made, not only in the moddles thereof, but also in the Prototyp last it selfe.

Of this sort, are all the Inuentions *Metallicall*, comprised in the Patent and also the Inuention called the Register for generall commerce.

R. 76. Define an inuention vntryable.

A. An vntryable inuention is a new proiect or discouery, whose worth and goodnesse requireth no tryals, but may bee iudged and discerned onely by the discription or declaration of the plot and proiect.

Of this sort are all Monopolies, new customes, imposts, taxations, subsidies, statutes, with fines, and diuers other state busineses, discoueries and inuentions, which are ordinarily propounded or petitioned of his Maiestie.

Of this sort is Sepherica, a late inuention of the Authours, the proiect and contents whereof shall be handled in a treatise called *Sepherica*.

R. 77. How many sorts of tryable inuentions are there.

A. An inuention tryable is either conformeable or inconformeable.

R. 78. Define a conformeable inuention.

A. A conformeable inuention is an inuention tryable which reformeth and bettereth a former inuention (requiring but some small and not chargeable alteration) after that the new is vnited to theould.

So the Iron furnaces, fineries and chafferries may be much reformed and bettered with small charges, hauing our Ferricall inuention vnited to them, and therefore the Ferricall inuention is fitly called a conformeable inuention.

R. 79. What Cannons or rules haue you for a conformeable inuention.

A

A. Conformeable inuention being priueledged is farre more beneficiall and commodious to the Patentees & the dealers in that busines, the an inconformeable inuention, and the reason is because that immediately after the grand tryals are brought to passe and performed in the Protoplast, they may choose whether they will be at any further charge, and yet they may raise present rent and benefit by conforming of the former inuentions to the Protoplast, and not at theirs, but onely at the charges of the owners of former works and inuentions.

R. 80. Define an inconformeable inuention.

A. An inuention is said to be inconformeable whose Protoplast being erected and set vp, cannot be conformed to any former inuention in vse, where by yearely profits of conformity may be raised without charges to the Patentees and dealers.

So the presseware inuention maketh tiles and bricke, and all other clayworks, after a farre more gainefull and beneficiall manner then by the ordinary course, yet neuerthelesse it is an inconformeable inuention, because that the ordinary Arts of tilemaking and brick-making cannot bee conformed vnto the Presse-ware Protoplast with some small alterations and small charges.

R. 81. What Cannons or Rules haue you of an inconformeable inuention.

A. An inconformeable inuention requireth a great stocke and great disbursements for the Patentees,

to lay out, aswell for the Protaplast as also for some two or three grander Mechanicks thereof.

Secondly an inconformable inuention after the erection and perfection of the Protoplast in continuance of time, may raise great rents and fines by licences, leases and deuises though no by present conformity.

R. 82. What other distribution haue you for an inuention Mechanicke.

A. An inuention Mechanicke, is either priuiledged or vnpruiledged, againe it is either a royaltie or a copy-hould.

A royaltie is such a new businesse, which in regard of the greatnesse thereof belongeth peculiarly to the King.

Ora royaltie is an inuention Mechanicke which produceth extraordinarie and worthie yearely profits and reuenues, whose valuation exceedeth the summe of ten thousand pounds. *per annum.*

R. 83. Define a copy-hould inuention.

A. A Copy-hould is an inuention whose yearely valuation and worth exceedeth not the summe of ten thousand pounds. *per annum.*

84. What cannons or rules haue you concerning royall or copy-hould Inuentions.

A. These Cannons belong to a Royall Inuention, first, no subiect or subiects, of what estate or degree soeuer by his seruice or demerit, except the Queene mother, the Kings children, is capeable of a whole entire royaltie, and therefore if the King haue passed a-  
way

way a royaltie, ignorantly, he may iustly recall and reuoke his graunt.

Secondly, a subiect may by his seruice to his Prince and Country, demerit part or portion of a royaltie, it being no greater then a Coppy-hould.

R. 85. What Cannons or Rules belong to a Mechanicke in respect of priuiledge or impriueledge.

A. First, it is most reasonable and fitting that a Mechanicke inuention should be priueledged for a certaine time wholly to the Inuentioner & Authour, if so be it be but of the yearely valew of a Coppy-hould.

Secondly, the first Inuention of a Royaltie though of meane degree hath as great demerit in the inuention, as any other subiect of what estate or degree soeuer, excepting Royall persons.

R. 86. What Cannons or rules haue you concerning Royalties.

A. There are diuers other rules and obseruations which I spare to speake of at this time, because at further leasure I purpose to Print a little Tractate of Royalties and coppy-houlds, which is a parcel of this treatise of *Metallica*.

## CAP. 12.

*Cannons or rules seruing to iudge of the goodnesse of a deuiniue Inuention Emporenticall.*

R

87 **H**ow may those who are willing to deale in the triall of new inuentions iudge of their goodnes.

M

Ther

A. There are many infallible Rules by which if a deriuative Inuention be examined, wee may easily iudge of the goodnesse thereof, but to reduce this doctrine to some head, we are to consider both the generall vertues, and generall faults in inuentions.

R. 88. What are the generall vertues by which an Inuention is to be examined.

The vertues of an Inuention are of two degrees, the lesser and the greater, and each degree is threefold.

R. 89. Which are the lesser vertues of a deriuative Inuention.

A. These three, Equi sufficiencie, Equi-cheapenes, Equi excellency.

R. 90. What meane you by Equi-sufficiencie.

A. Equall sufficiencie is when the new Inuention or Emporeuticke is as sufficient and as good for vse as theould.

So Printed bookes are as sufficient and as good to reade as written Manuscripts, and the meale grinded by the winde-milne, is as good and sufficient to make bread as that which is grinded by the water-milnes, and earthen pipes by the Pressorian Art, being well made are as strong to hould and conuey water as leaden pipes or potters pots, which two kindes of water conueiances were in vse long before presse-ware pipes were inuented.

R. 91. What meane you by the second vertue which you cal equi-cheapenesse.

A. The new Emporeuticke is said to haue equi-chea-



cheapenes, when as it may be sould and vttered as cheape as the ould commoditie or inuention which was in vse before.

So if Printing bookes be but as cheape to be sould as manuscript bookes, then they are said to haue equi-cheapenes.

And if Tiles made by the Pressorian Art may bee afforded to be sould and vttered as cheape as the tiles made by the ould and ordinary way, then the Presseware Tiles may well be said to haue Equi cheapenes with ordinary Tiles.

R. 92. What meane you by the third virtue which you call Equi-excellency.

A. The new Inuention is said to haue Equi-excellencie with the ould, when it hath in it the same beautie and perfection that the ould commodity of sale hath, and in the same degree, measure and equallitie.

So if Muscouie glasse be as cleare, transparent and excellent as greene glasse for windowes, then in regard of the beautie and perfection of the substance it is said to bee Equi-excellent.

R. 93. Which are the greater virtues of an inuention.

A. These three, more sufficiency, more cheapnesse, more excellency, all which are easie to be vnderstood, by their lower degrees described before.

R. 94. Which are the lesser faults of an Inuention deriuatiue.

A. There are three in number, lesse sufficiencie, lesse cheapenesse lesse excellency.

R. 95. Which are the greater faults of an Invention.

A. There are also three, insufficiency, exceeding dearenesse, exceeding basenesse, vgliness or ill fauourednesse,

R. 96. What Cannons or rules haue you to iudge of a deriuatiue Invention, by comparing these vertues and faults together.

A. There are many, whereof these following serue to iudge of the vnworthinesse.

R. 97. What is the first Cannon.

A. If an Emporeutick haue only in it all the smaller vertues, although it may be esteemed commendable for a new inuention, then surely it will do no good to be set vp and followed.

So if any clay worke made by Presse-ware art, as namely tile, slate, free-stone, paving stone, archings. &c. or greene glasse made by Seacoale, If these two new inuentions fall out to be but Equi-sufficient, Equi-cheape and Equi-excellent, with old Inuentions of tiles, slates, free stone, paving stones, archings &c. then surely there will be no good to be done by them, because they yeeld no benefit to the common wealth.

R. 98. What is your second Cannon to iudge of the worthlesnesse of an Invention.

A. If a new Invention of sale haue in it but all the smaller faults only, it is not to be commended nor ~~it will produce good~~, for example, if one should deuise a Water-worke, to raise waters, which is lesse  
suffi-

sufficient for that purpose, and more chargeable to be erected, and in regard of excellency more imperfect then the ordinary raising of waters in use, I say such an Emporeutick is to be iudged a worthlesse Invention.

R. 99. What is the third directory Cannon.

A. If a new inuention, compared with the old, be found to haue in it but one of the grander faults, although it be accompanied with some one or two of the grand vertues, yet is it to be reiected for starker naught, for there can no good be made of it, for instance sake say that one hath deuised to make windowing of the pure mettles of Venice glasse, or of the pure substance of Christall, which is not impossible to be done, This his sale Mechanick will be exceeding deere and costly, And therefore although it be more excellent or stronger, or more sufficient then the ordinary kind of windowing by greene glasse, yet the Inuentor will neuer do good of it, except it bee to begger himselfe, and all that shall deale in it: for a scrap of colloquintida, I say, marreth a whole messe of good potage.

R. 100. How many directory triplicities is there of this Rule.

A. There are,

First exceeding deerenesse, more sufficiency, more excellency.

Secondly insufficiency, more cheapnesse, more excellency.

M 3

Thirdly

Thirdly vnſightly baſeneſſe, more ſufficiency, more cheapneſſe.

This laſt triplicity althoꝛgh it hath two good grand vertues, yet the buyers of this Emporeurick will not deale with it, becauſe they cannot abide to behold it.

R. 101. What other triplicities are there of this Cannon.

A. Three by one grand vertue, and three by another, which for breuities ſake I omit.

R. 102. What other Cannons haue you to iudge of the worthleſſneſſe of an Inuention.

A. If an Inuention containe all the grander vertues, and yet tend to the vtter confuſion of Kingdoms and Ciuill Eſtates, then is it by no meanes to bee attempted or enterprized by any Inuentioner, Of this kind is the *Inuention to walk inuiſible*, if ſuch a deuice may be attained vnto, *to make a barge or ſhip to flye* as well in the ayre as to ſaile vpon the water.

R. 103. What Cannons or Rules haue you to iudge of the goodneſſe and worth of a deriuatiue Inuention.

A. There are many Cannons likewise for this purpoſe, all which are grounded vpon triplicities of the former vertues or leſſer faultes, or intermixt of both.

R. 104. What is the firſt Cannon.

A. An Inuention that hath none of the grand faults and hath at the leaſt one of the grand vertues, or more in his triplicity, then is it to be eſteemed good and valuable as it appeareth by al theſe ſubſequent triplicities.

R. 105.

R. 105. Recite the triplicite of this Cannon.

1. A. More sufficiency, Equi-cheapnesse, Equi-excellency.

As for example, earthen tileage is more sufficient and durable, equi-cheape and equi-excellent then the old way of couering of houses by woodden pannells, when wood and timber was then as plentiful in England as is now in Virginia or new found land, and therefore a very good Inuention.

2 Equi-sufficiency, more cheapnesse, Equi-excellency.

3. Equi-sufficiency, Equi-cheapnesse, more excellency.

4. Equi-sufficiency, more cheapnesse, lesse excellency.

5. Lesse-sufficient, more cheape, Equi-excellent.

Of this sort is *Lees* Inuention of loome stockings, and the tillage of ground by Plough and harrow, comparing it with *Adams* old tillage with spade and Iron rake, which Gardners still vse.

6. More sufficiency, Equi-cheapnesse, lesse excellency.

7. More Excellency, lesse-cheapnesse, Equi-excellency.

8. Equi-sufficiency, lesse cheapnesse, more excellency.

9. Lesse-sufficiency, Equi-cheapnesse, more excellency.

10. More sufficiency, more cheapnesse, Equi-excellency.

11. More sufficiency, more cheapnesse, less excellency.  
Equi-

12. Equi-sufficiencie, more cheapnesse, more excellency.

13. Lesse sufficiencie, more-cheapnesse, more-excellency.

14. More sufficiency, Equi-cheapnes, more excellencie.

15. More sufficiency, lesse-cheapnesse, more-excellency.

16. More sufficiency, more cheapnesse, more-excellency. Which is the best and most eminent of all other triplicities.

### CAP. 13.

*Metallicall Instruments defined with their severall kinds. Lenicks, Presse-wares and mouldes described.*

*Reader.*

106. **T**He Manuscript Treatise or Schedules annexed to the Indenture, as it seemeth, comprehendeth many worthy matters and excellent inuentions, but it is some-what obscure and obstruce, both by reason that some points are implicitly set downe, and also in respect of some strange and hard words which I doe not perfectly conceiue or vnderstand: I pray you therefore enlarge and describe the same Materiall points, in a more familiar phrase and stile, that such plaine men as my selfe, who are willing to deale and aduenture in these your inuentions, may  
more

more fully vaderstand the purport and goodnesse of your businesse.

A. Sir you neede not be offended with the schollasticall tearmes, for it hath alwaies beene lawfull to the Authours of new Arts and inuentions at their owne pleasure to giue names to their new Arts, instruments and deuises which are not so vulgarly knowne. Goe but to a Printer, and you shall heare many strange words of his inuention and misterie, as namely *Charrecters*, the *Compositer*, the *Long-primer*, the *Pica*, the *Italica*, the *Chase*, &c, the like tearmes you shall finde in diuerse other trades in London.

I hope therefore I shall not be barred or denyed of that libertie of making choice of words of Arts, for new matters, which is giuen and allowed vn. to euery tradesman in his owne scyence and misterie.

Indeede I confesse that some points are more closely and briefly touched of purpose, and the reason was, because I had often promised to explaine and illustrate them in the printed treatise, and it would haue bin both tedious and more chargeable to haue drawne the manuscript in a prolix and ample sort.

Neuerthelesse to the intent that no iust exceptions may be taken, and that the meanest capacitie may perceiue my meaning, I will be ready to explaine and amplifie the seuerall contents of my Patents in as plaine and easie mannner as I can thinke or deuise.

R. 107. It is euident by your Pattent, that all Mechanick Artes and Inuentions which performe their worke by the helpe and opperation of *Metallicall Instruments*, are all of them priuiledged busineses vnto you. Wherefore I pray you describe at large all the sorts of *Metallicall Instruments* and meanes, which are the strength, nerues, and sinewes of your priuiledge.

A. The Instruments and meanes *Metallicall*, which are vsed for the producing of Metalique Materials, or things are (as it was shewed before) of two sorts, *Common* and *Peculiar*.

The *Common Instruments* are such which are borrowed from other trades, occupations, and mysteries, amongst which wee haue especially vse of Smithes, Ioyners, Turners, not onely of their instruments and tooles, but also of their Emporeuticks which they ordinarily make, as Presses, Vices, Screwes, Bellowes, Tongs, &c. made either of Iron and wood, or of both together.

R. 108. What call you the peculiar *Metallicall Instruments*.

A. The *Peculiar Instruments* are those that are of the Authors Inuention, being of chiefe and principall vse for the working of *Metallicall* effects, when they are vsed and conioyned with other *Common Instruments*, and they are of two sorts, *Principall*, and *Lesse principall*.

The *principall* are those which in the Manuscript are called by the names of *Lenick*, *Plegnick*, & *Camminicks*.

R. 129.



R. 129. Define the *Metallicall* Instruments, which are called by the name of *Lenicks*.

A. The *Lenicks* are peculiar *Metallicall* instruments, which worke their operation and effect, by pressing, impressioning or moulding, and that either by thrusting or drawing.

R. 110. What call you the Emporeutick materials which are made by these *Lenick* Instruments.

A. The Materials that are made and brought forth by these pressing & moulding instruments, are called *Press-wares* or *mould-wares*.

R. I pray you set downe the definition of *Presse-wares* or *Mould-wares* together, with their severall sorts or kinds.

*Presse-ware* or *Mould-ware*, is any thing that can bee made, wrought, or formed of clay and earth, not by hand and the round table, as the Potters vse, nor after the common manner of Tile-making and Brick-making, but by presse and mould, or by pressing and moulding.

There bee many sorts or kinds of *Press wares* by reason of different figures, and diuerse vses vnto which they are to bee applied, all which kinds are reduced to these two heads: *Rude-ware* and *Pollishe-ware*.

*Rude-ware.*

R *Vde-ware* are such sorts of *Presse-ware* which after they are pressed and moulded, require no further ornament.

*Pipeage* is the principall branch of *Press-ware*, and it is nothing else but the making of earthen pipes, for the conducting and sweeter conueighing of fresh waters, for the seruiceable vse of houses.

*Field Pordage*, is a kinde of *Pipeage*, which from higher springs and founraines conueigheth and distributeth water into severall pastures, closes and fields, and in euery one of the said places, maketh and leaueth a pond of water for cattle and beasts to drinke in, this kinde is very necessary for country townes, where there are but some few springs, and many hundred of inclosed pastures, which in the heate of Summer want waters.

And *Kennellage* is one of the chiefe kinds of *Pipeage* which passeth and voydeth away the stincking and filthy waters of citties and townes vnder earth into the common ditches or sewers, and this kinde is very necessary for the auoiding of noysome and infectious ayres, especially in the heate of Summer.

Of *Presse-ware*s also are made *Pumpes*, as sufficient as those of Lead or Wood, and farre lesse chargeable. *Wellage* is a kind of *Press-ware* for the speedy making of Wells, farre cheaper then the rounds, which are made of Brick to keepe the earth from falling downe.

*Priny Funnels* or *Vaults*, may also bee made by the *Press-ware* Art so close and so sweete that there can be no annoyance or vnfauory smells euapoure out or presse through them. This kind of *Presse-ware* is very necessary for many houses in the city, which are  
much

much annoyed by the leaking and sincking through the funnels of Brick.

As *walls* are made of ordinary Bricks, so may they be made of Press-wares more handsome, cheaper and dureable.

Open *Gutters* are made by the Press ware way, which may serue betweene houses instead of Lead, or in Fields to conduct and lead away water, or on the Eues of houses or Pent-houses.

The *Press ware Arte* likewise, ministrech a kinde of *Tiling* and *Slates* for the couering of houses more substantiall and dureable then those that are made by the ordinary way of Tiling, or then those blew and hewen Slates which are digged out of the Slate Quarries.

*Spouts* ordinarily are made of Lead, and hanged on the our-side of the walls, but Spouteage may more conueniently be made of pipes, brought downe with-in the middest of the Brick walls, for to couneigh raine water into the sincks vnder the earth.

*Polisht-ware.*

*Polished-ware*, are such sorts of Presse-wares, which after they are pressed and moulded, receiue further ornament and beauty, by Turners, Ioyners or engrauers tooles, or by Turning, Planing, or engraving, and there are three degrees of this ornament, for else it is inecrely by cutting off the edge, when the Presse-ware of Clay is liuer dry, or else by repressing againe,

which is when they Presseware is figured or fashioned the second or third time with the mould againe. The third degree is by fire, colouring, which is the glazing, glazing or leading of the Presse-ware, this addeth a super-excellent grace and lustre to the worke, if it be well and curiously done and performed, and it hath in it this singular prerogative. For whereas freestone greeneth presently with the first wet and raine and after in continuance of time becometh overgrowne with mosse, or else moultheth or crometh away, but this sort of Polished ware continueth alwaies in his natue and liuely hew, neuer tainting or altering with any weather, no more then the stone Iugs or Cruses, which we vsually drinke out of.

Of Pressewares also we may make all kinde of *pa-vingstones* larger and greater then those which are made by Potters or Tilers, which kinde is very seruicable. for pauing of houses, galleries, ouens, courts, and furnaces.

*Fish-ponds* may be both flored in the bottome and wainescotted on the sides by the Presse-ware Art, so sufficiently, that neither the earth can fall downe, nor the ouse or mudd to swell vp within. So likewise for bathes and baynes.

Spouts, ordinarily are made of leade, and hangd on the out-sides of the wals, but they may be made of turned Pipes being also beautified with glazing, leading, or other ornaments, stamps or impressions..

The

The like may be said of *windowing* and *Manyons* for windowes, which may be made and cast of white clay, as sufficiently and substantially as of hewen bricke or Freestone.

*Gardens, Squares, and walkes* are vsually compassed and inuironed with railes and pales of wood or stone; this may also be done by Presse-ware, cheaper, stronger and handfommer.

In a word there is no part or appurtenances in buildings, which is made either of Bricke, Tile, Lead, Wood, Tarras, or Free-stone, which cannot more conueniently be made by the Pressing Art of casting, and the reason thereof is, because that mouldes may be made to cast all kinde of Solid shapes, figures, and bodies whatsoeuer.

So that from hence also we may make Bullets, Globes, Coping stones, Archings, Pillars, Columnes, Finishings, Chimney Fannels, Mantlétrees, or Clauels for Chimnies, Cesternes, Coppers to brew in, Wainelcoaring for Chambers, and such other like things, and Vtenfils.

R. 112. What are the generall and chiefe instruments of making of Pressewares-

A. The instruments of Pressing and moulding, which are vsually called by the names of Presse and mould.

R. 113. How many kinde of Presses or Pressing Instruments are there.

A. Pressing or impressing of things is performed by diuers meanes, as namely by beating, stamping, knocking, or falling.

Secondly

Secondly, by screwing or viceing. Thirdly by the drawing of flexible girths or cordes. Examples of all which sorts, are to bee seene at my worke-houſe at Highbury, in the pariſh of Iſlington neere London.

R. 114. What call you a moulding instrument, mould or moulder.

A. A *Mould* or *Moulder*, is an artificiall instrument which mouldeth, figureth, and proportioneth the tempered earth, which beeing forced, paſſeth thorough the mould.

R. 115. How many ſorts are there of Moulds or Moulders.

A. Moulds are of two ſorts, for either they are as long as the Preſſware, which they make and figure, of which ſort are all thoſe which are called by the names of ſcouring moulds at the *worke houſe* at *Highbury*, or elſe they are ſhorter then the preſſe-wares which they make, wherevpon they are called *Short Mouldes*. Diuers ſorts both of long mouldes and ſhort moulds, are to be ſeene at the ſaid *workehouſe*, and therefore I will not further enlarge or deſcribe them heere, but referre the Reader to ſee them at the place afore-named.

R. 116. When a preſſe and a ſhort mould are in one frame vnited together, what is the fitteſt name to call that instrument by.

A. It may aptly in a word be called a *Preſſe-mould*, which is further deſcribed and handled in the next chapter.

*The Pressmould: and the Plegnick  
Instruments defined.*

R.

117 **D**escribe therefore the Press-mould by his end and vse.

A. A Press-mould is a pressing and moulding Instrument for the making of all kind of Press-wares, that is to say, all kind of tiles, bricks, paving-stones, furnace-stones, or any kind of clay-worke or tempered earths whatsoever.

R. 118. Describe the Press-mould by his parts and adiuncts.

A. The Press-mould consisteth of these generall parts.

1. Two clay-boxes.
2. Two Receit tables.
3. One Screw.
4. Two Pressours.
5. Foure Anti-pressoures.
6. Two Nutboxes.
7. Two squeeze tables.
8. Two Coane spits.
9. Two Screw posts.
10. Frames for the said parts.
11. Driers and Rammers, which are adiuncts.

There are many sorts and differences of Press-moulds; every sort consisting of different parts and adiuncts,

O

All

All which shall be at large described in the second edition of Metallica, or in the Appendix, or addition vnto this treatise called *Pressoria*.

In the meanwhile if any be desirous to see both this Presse-mould, Engin and the working thereof, at *Highbury*, and at *Ipsington*, he may haue diuerse sorts of them, which in an Artificiall manner doe make all kinde of Clayworkes with extraordinary speed and readinesse.

R. 119. I vnderstand what you meane by Lenicke Instruments, I pray shew what vse they haue in Iron businesse.

A. First, the Lenicke Instruments serue very fitly for the tempering, stamping, and comixing of Seacole, or Stone-cole, that a kinde of substance being there made of them like vnto past or tempered clay, the Presse-mould may forme and transfigure that clay-like substance into hollow *pipe-cole* as it doth earthen pipes.

Now this *pipe-cole* is of very good vse for the making and working of some kinds of Irons and steeles.

Secondly the Lenicke Instrument serueth very fitly for the breaking and brusing, stamping and beating, tempering and impastening of all kinde of Iron oares, whereby they are prepared for the Furnace in a very beneficiall manner and course, for when this impasted oare is by the engin of the Presse-mould *intubated* and formed into pipes, as if it were Clay or loame, These oare-pipes being made hollow and full of holes are sooner melted and consumed by the heate of the furnace



furnace and with farre smaller charges of sewell or firing then the ordinary oare which Founders put into their furnace in peeces or gobbits as great as wall-nuts.

R. 120. You hauing handled sufficiently the doctrine of the Lenickes or Pressing instruments, I pray you proceede and shew me what you meane by Plegnickes, which your Maunscript maketh the second kinde of your *Metallicall* Instruments.

A. Plegnickes and *Metallicall* instruments which performe their operation and effect by meanes of their dexterous and artificiall ioynt-mouing.

R. 121. How many kindes of Plegnicke instruments be there.

A. There are five kindes of Plegnicke engins or Machins, the Plegnicke *Bellows*, the Plegnicke *Milne*, the Plegnicke *Screw*, and the Plegnicke *Rombus*, and the *Reciprocall* Plegnicke.

R. 122. What odds and prerogatiue differences is there betweene the ordinary bellows (which Smithes and Mettle-founders daily vse) and your new deuised Plegnicke bellows.

A. There are many differences, first the Plegnicke bellows is more handsomely and strongly made, then ordinary refining bellows, and with farre lesse expence of leather, for here the leather is not closely nailed vpon the wood, but strongly grafted and incorporated into the very substance of the timber, so that by this meanes the ioytning of the leather and the wood together, is as thite and close as the sub-

stance of the boords themselves.

Secondly the Plegnick bellowes may be made to blow and streame forth not only could wind and ayre (which is all that ordinary bellowes can doe) but also to blow and send forth flames of fire, water, vapours and dust, all which is very necessary for the blowing of *Metallicque* substances, as shall be at large shewed in the second Edition or in the Appendix called Plegnica.

Thirdly the Plegnick bellowes may so be made and contriued, to blow ten times more then the ordinary bellowes, and that either by moouing ten times faster, or else by being made ten times greater.

R. 123. What odds and prerogatiue differences is there betweene the ordinary Milnes and your new deuised Plegnick Milnes.

A. The Plegnick Milnes haue many prerogatiues and conueniences which the ordinary Milning lacketh: and to begin with the Wind milne.

First the ordinary Wind-milne hath not only his sailes mounted vp in the wind, but also the worke-house wherein the Milne stones and the Cogg-wheeles grind the corne, by which meanes they are subiect to bee blowne downe with stormes, but the Plegnick Wind-milne hath his worke-house vpon the firme ground, by meanes whereof you may make your Roomes as wide and as large as you will without any hazard or danger of blowing downe.

Secondly the crosse sailes of the Wind-milne doe mooue *verse caliter*, as they cal it, or through the *zenith*

*neth* or the *nader*; wherevppon ariseth this inconueni-  
ence that the Wind-milne must be turned and haled  
about continually as the wind changeth, but the Pleg-  
nick Wind-milne hath his crosse-failes ouer the top  
of the work-houfe, and they flye round about with a  
circular motion, paralel to the *Horizon*; whereby it is  
ready for all windes without turning or haling about.

Thirdly this Plegnick deuise may be made to go with  
three or foure paire of Milne-stones at once, whereas  
the wind-milne cango only but with one paire, and  
by this meanes the Plegnick Wind-milne will grind  
three or foure times more meale in an houre, especially  
in a good gale of wind.

Fourthly the Wind-milne grindeth only corne, and  
cannot be made to do any other worke, as the water-  
milne doth, but the Plegnick engin doth all manner of  
workes, it will grind corne as well as the Wind-milne,  
it will serue for the Iron furnace to blow the bellowes  
as well as the ordinary Water-milne, and finally to do  
any other worke which the Water-milne or Horse-  
milne doth.

Fiftly the Wind milne standeth still in a calme and  
when the wind serueth not, for there is no meanes to  
make it goe but by wind, but the Plegnick milne is  
perpetuall, for when the wind serueth not, it is made  
to go with horse, and in a small gale of wind the horse  
may help to draw and mooue it faster.

Sixtly there are also many other conueniences in the  
Plegnick Water-milne ouer and aboue the ordinary  
water milne as more at large shall bee shewed in the

Second edition of this treatise.

R. 124. How many sorts of Plegnick milnes are there in regard of the force that mooueth the Engin.

There are five sorts of Plegnick milnes, The first is called the *Horfwin* because it mooueth both with horse and wind, the second kind is called the *Horsewater* because it goeth both by horse and water, The third kind is called the *Windwater*, because the Wind and the water moouerh the engin ioynntly together.

The fourth kind is called the *Horfwinwater* because it is mooued with horse, wind and water altogether, and at one time. The fift kind is called the *water.Plegnick* which mooueth either inuisibly and secretly vnder the water and by the water with one rong wheele or elce with two Horizontall wheelles aboue the water.

R. 125. Did you euer make any of these Plegnick milnes to experiment their goodnesse by triall.

A. I haue made diuers milne engins to go both by wind and water, in the moddle, but not in the grand Mechanick, and I haue at this present a horfwin now framing at Highbury, which the next terme God willing shall stand vppon some Turret in London neere vnto the Thames side, where all passengers by water may see it goe and mooue continually. I haue also at Pickle-herring ouer against the Tower a water. legnick which mooueth only by the water, and goeth very swift with two paire of Milne-stones, whofoeuer

euver is desirous to see it may haue it there at a Ship-Carpenters yard vppon the Wharfe. And thus much of the Plegnick milne.

R. 126. Define the Plegnick Screw, the Plegnick Rhombus, and the reciprocall Plegnick, which are the three last kinds of your Plegnick Engins.

A. The plegnick screw is an engin whose spirall line mooueth with one motion, two vice nuts or Matrixes at the same time, which no other screw did before, This plegnick screw is very auailable in *Metallicall* workes, aboue any other ordinary screw, which hath beene vsually in the common wealth, but especially it is very conuenient for tempering, beating and impastening of all kind of oares and pit-coales

The plegnick Rhombus is an Engin of extraordinary and admirable power and faculty, and in regard of quick and speedy motion there was neuer any Machin yet deuised, which commeth nere vnto it.

The Reciprocall Plegnick is an Engin that hath wheelcs running reciprocally, turning backwards and forewards by one great wheele that mooueth but one way at the same time which kind of reciprocal motion was neuer done or performed before by any other Engin.

This reciprocall is of great vse for the battering and beating of Iron, latten, plate, copper, or any other mettles.

If any be desirous to be further certified concerning the truth of the admirable motions, operations and workes of these three engines, let them repaire to *Highbury*, and it shall be evidently shewed and demonstrated vnto them, in diuers reall moddles and examples.

## CAP. 15.

*Caminicke instruments, as  
fewels, liquours and  
furnaces defined.*

127. **H**aving described the Lenicke and Plegnicke instruments, I pray you proceed to the third kinde of *Metallicall* instruments, which you call by the name of *Caminicks*.

A. *Caminicks* are peculiar *Metallicall* instruments, which performe their operation and effect by their new kinde of furnacing and hearthing.

R. 128. How many kindes of *Caminicke* instruments be there which serue for the making of all kinde of Irons and other mettles and materials.

A. There are three kindes, the fewell, the liquor, and the furnace.

R. 129. Define fewell.

A. Fewell is any substance combustible being apt or fit to burne, or to make, or take fier.

R. 130. Rehearse the severall kindes and sorts of fewell.

A.

A. There are three sorts of Fewell, whereof fire is made: Wood.fewell, which is either Char.coale or vnburnt Wood.fewell. Secondly Pit.coale or Earth.coale, and thirdly Brush fewel.

Char.coale is the Principall and best for vse, but by reason of scarcety it is growne very deare in our country.

*Earth.coale* is that kinde of fewell of firing, which is digged out of the bowels of the earth, or else vpon the superficies of the earth, of which sort also there are many kindes, hauing difference in their burning. The *Scottish coale* is the best flamer, and consumeth away into white ashes, as hauing in it more vnctiousnesse then sulpharousnesse. The *New-Castle coale*, vsually called Sea.coale, is more lasting and dureable then the Scottish, for beeing stirred vp, it will make a secondary or third fire, whereas the Scottish.coale consumeth at once; For which cause all Brewers and artificers of London rather vse this sort. Howbeit it is not so fit for some Metalique purposes as Scottish.coale, by reason of the more abundant heauy sulphurous substance remaining in it.

*Turffe* and *Peate* maketh a third kinde of earth.coale, and if they haue any sulpharousnesse in them, it is not so heauy and fretting as that which is in the Sea.coale and Stone.coale, the Low.countries vse for the most part this kinde of fewell, instead of wood & sea.coale.

Brush.fewell is the third kind of firing, which is neither of the inward substance of the earth, nor of the vpper superficies as Sea.coale and Turffe is, but groweth vpon the earth in a brushie or twiggie manner, of this sort is all kinde of stubble, Baueings, Straw, Furs, Fearne, Ling, Heath, with other stalkes, of hearbes,

weeds, and vnder-shrubs, all which burne with great flames, yet are they of no great heate or long continuance. Vnder Brush-fewell, wee comprehend also an other sort, which is not so much vsed for firing, as for lights, as namely, oyles, tallowes, waxes, which are vsed in lampes and candles. Secondly, pitch, rossen, turpentine, tarre, mastick, with such like liquids and gums, as issue and proceed from trees beeing combustible. This kind of fewell is most fit for the *Ventignoll* Mechanick, which hath good and profitable vse for many purposes, where other fewell is not so fit.

R. 131. What meanes are to be vsed to make earth-coale as seruiceable for Metalique purposes, as wood or Char-coale.

A. There are three sorts, the first is to bring earth-coale to that equality of heat, that wood or charcoale hath, that is to say, that it maketh neither hotter nor cooler fire then wood or Charcoale doth: the second meanes, is so to order and prepare pit-coale, that all nociue proprieties, which are auersse from all Metalique substances, may be abstracted from it, or at least destroyed in it. The third meanes is the Addition and infusion of those deficient proprieties, which as they are in char-coale, so ought they to be found in pit-coale.

R. 132. What meane you by *Caminicke-liquores*.

A. By *Caminicke-liquores* I vnderstand diuers kinds of intermixt and compounded waters for the lauing, washing and steeping of all kinde of mettle-Ewres to cause them the better to yeeld and giue downe their liquid mettle from their slaggs and cinders.

So that as the Gould-smith hath his waters which will segar gould from siluer, and the Allom-maker his vrines for the segaring and bringing downe of his alloms



lomes, so these *Caminicke-liquowres* are very behoofe-full and effectfull for the steeping and tempering of oares, which being thereby prepared, they will the more easily let downe their pure mettle being seuered and abstracted from the recement and drosse of the cinder and the slagg.

R. 133. Define a furnace.

A. A furnace is a *Caminicke* instrument made and built of furnace-earth; or a furnace is the Artificiall recepracle of fier and fewell, for boyling, nealing, and backing of all kinde of Rawe-materials or Rawe-matters.

R. 134. How many kindes of Rawe-matters are there for furnaces to worke vpon.

A. There are five sorts of Rawe-matters, the mettle-matter, the liquour-matter, the fiery earth-matter, the dry matter and compounded-matter.

R. 135. Describe more plainly these seuerall kinds of Rawe-matters.

A. The Mettle-matter is that Mettellar substance which is put into the Furnace to be baked, boyled or nealed, which in one word may be called the Mettellar.

R. 136. How many kindes of *Mettellars* are there

A. There are three sorts of *Mettellars*.

The first is the raw or baked oare, as it is digged out of the earth, which being put into the furnace melteth downe into two substances, the one is called the *Glass-slag*, and th'other the *Sowe liquour*.

The *Glasse-slag* is a liquid materiall of a glassie substance being tough, thicke, and ropy, like bird-lime, it swimmeth vpon the superficies of the sowe liquour, as barme doth vpon beare, or creame vpon milke.

The second kinde of Mettellar is the sowe of Iron which when the hearth or furnace hath receiued it, it melketh downe into two substances, whereof one is called *Ferrica substantia*, or the Iron substance, the other is called the cinder or after-flagg.

The after-flagg is a liquid materiall which inhereth in the *Ferrica substantia*, as whey doth in a posser, or crudds.

The *Ferrica substantia* is tougher then the liquour of the alter-flagg, which when it is battred vnder the stroke and presse of the hammer, the after-flagg is squeased and pressed out, and so the *substance* is made and becometh good Iron, euen as the whey is wrung out by the violence of the Presse, and so the cruds are made into a cheefe.

The third kinde of Mettellar is the could Iron, which when the forge, furnace or hearth receiue it, it is nealed and heated into glowing Iron, which glowing Iron afterward is forged by the Smith into diuers Emporeutickes for many-fould vses and purposes, as namely into kniues, horse-shooes, Iron-weapons, windowe barres, window case-ments, and into a thousand such like Emporeuticks, whereby Smiths get their living and maintenance.

R. 137. In the definition of your Furnace, you make mention of Furnace-earths, I pray you what meane you by them.

A. Furnace-earth, is any earthy substance, beeing made and prepared of stone, clay, or lome, that so it may become the fit and sufficient matter for the *Caminick* Furnace.

R. 138. How many kindes of Furnace-earths are there where-withall you build vp your Furnaces.

There are three sorts of Furnace-earths. The first is the clay-pipes made of white clay, being tempered, wrought, and impastned with the dusts and pouders of diuers other things. The second kinde of Furnace-earth, is the clammy mortar, which is of the same substance and temper that the Clay pipes are. The third kinde of Furnace earth, is the Furnace-stone, which is made into diuers figures, formes and proportions by the Presse-mould Art, and of the same matter that the other two kinds were made of before.

R. 139. Define the second kind of Rawe-matters, which you call the Liqueur-matter.

A. The liquor matter is any kind of liquor or liqueable, whether it be cold or hot, which is put into the Furnace Pot, Kettle, Caldron or Copper, to be further heated, and boyled, as namely, all kinds of fatts, tallows, oyles, and all kinds of waters, whether simple or compound, as fresh-water, Sea-water, Allomf-water, Copprisse-water, and a thousand such kindes of liquours.

R. 140. Define the third kinde of Rawe-matters which you call fiery-earths.

A. Fiery-earth is any kind of earth or earthy substance besides the Mettler which before was described, as namely all kind of Rawe Presse-wares and burnt-earths, before they are burned, baked or nealed, neuerthelesse the Rawe-oare if it be but nealed or baked belongeth to this kinde.

R. 141. Define the fourth kinde of Rawe-matters which you call dry-matters.

A. Dry-matter is any kinde of Rawe-matter besides the three former which were described before, vnder this head wee comprehend all kinde of pastes for bread, malts, safrons, papers, wet cloathes &c.

R. 142. Define the fift kinde of Rawe-matter which

you call compounded matter.

A. Compounded matter is any two or more of the former kindes, comming and issuing from one furnace and from one fire, together, and at the same time.

R. 143. Having thus handled and described the severall sorts of Rawe-matters, which are the things that the stommack of the Furnace worketh vpon, labouring to digest boile, and conceit them, I pray you now proceed to the distributions of the Furnace.

A. The Furnace in respect of the severall kinds of Raw-matters which it boileth and baketh, is likewise of five sorts and kinds, namely the Mettellar-furnace, the liquor-furnace the fier-earth-furnace; the dry-matter-furnace, and the compounded-furnace.

R. 144. Define these five severall sorts.

A. The Mettallar-furnace heateth, melteth & nealeth all kind of Mettallers, and so worketh them into their Empo-rentick Materials, vnder this head is comprehended all kind of Iron Furnaces or hearths, for any other kind of mettles.

The descriptions of the other foure kindes of furnaces may easily be gathered by this, and therefore I referre the further explication of them vntill some other time.

R. 145. What odds and perogatiue differences are there between the ordinary furnaces which refiners and mettles-founders daily vse, & your new deuised *Caminick* furnaces.

A. There are many differences both in regard of the forme & figure of making of them, as also in respect of other conueniences and prerogatiues, whereof these are principall.

1. First our *Caminick* Furnace is made and built vp of such dureable Furnace-matter, and continually maintained with such fier-resisting meanes, that it cannot possibly melt or burne down by any *reuerberating* flames or heates whatsoeuer.

2. Secondly, our *Caminick* Furnace is alwayes built with

with some moueable part, as namely the dores, *Fewell-beare*, *matter-beare* and the *Ash-beare*, or any other part as wee please.

3. Thirdly our *Caminick* Furnace is built vp with glasse windowes for euery seuerall roome, so that thereby the Furnar may continually see and behold both his Raw-matters and his Emporeutick Materials, and how his fire and Furnace worketh vpon them, which is a singular conuenience which our ordinary Furnaces want.

These forenamed differences and conueniences, with many others, shall be truly shewed and demonstrated in the seuerall examples of our *Caminick* Furnaces, which very shortly (God willing) shall be raised and built vp at Highbury and at Islington.

R. 146. What & how many are the generall parts of your furnace, which are to be found in euery kind of your *Camin*.

A. These fīue, the dores, the windows, the *fewell-beare*, the *Matter-beare*, and the *Ash beare*.

1.2. The *Dores* are to shut and open, and so are also some of the *Windowes*.

3. The *Matter-beare* is a generall part of the Furnace, which bereth & holdeth the substāces of the Raw-matters.

4.5. The *Fewell-beare*, is a generall part of a Furnace which beareth and holdeth the *fewel* and fire, and the *Ash-beare* beareth the *Ashes*.

R. 147. What and how many are the roomes of your Furnace which are to be found in euery kind of your *Caminicks*

A. There are foure seuerall roomes, which are to bee found in euery Furnace, the *Ash-roome*, the *Fewell-roome*, the *Matter-roome*, and the *Vent-holes*.

The *ashroome* receiueth and holdeth the *ashes*, the *fewell-roome*, the *fewell* and *firing*. The *matter-roome* receiueth and holdeth the *raw-matter*. The lower *vent-holes* receiue and take in the *aire*, and the vpper *vent-holes* lets out the *smoake*

R. 148.

R. 148. Hauing thus described your three principall *Metallicall* Instruments called by the names of Lenicks, Plegnickes, and Caminicks, I pray you describe your other *Metallicall* Instruments which you called before the *Leſſ-principall*.

A. There are indeed diuers other *Metallicall* Instruments which are proper and peculiar of the Authors Inuention, all which ſhall be ſhewed and described vnto you in the ſecond Edition.

R. 149. To what end and purpoſe do you publiſh the treatiſe of *Metallica* in print, which describeth and diſcouereth all the cheefe Instruments of your Inuentions.

A. There are diuers reaſons which mooued the Author to deſcribe publiquely to the view of the world theſe his *Metallicall* Arts and Inuentions.

Fiſt that it might appeare that his inuentions are new, and of his owne deuiling, and not ſtolne from any other.

Secondly it is fit and reaſonable that that which was granted in the Patent by generall wordes and in an implicit manner ſhould be ſo ſpecially expreſt and defined, that the endeauors and Inuentions of other men being different from his, might not be preuented by him.

Thirdly that none hereafter ſhould preſume to petition or trouble his Maieſty concerning any kind or kindes which are deſcribed and comprehended in his printed treatiſe of *Metallica*, which are all priueledged buſineſſes vnto himſelfe.

And laſtly becauſe the Author by Indenture from the Kings moſt excellent Maieſty is tied and enioyned to print and publiſh his booke of his new *Metallicall* Inuentions before the laſt day of Eaſter Terme, whereas he is not tyed to any time for the triall of his Inuentions.

